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THE SIGNIFICANCE OF ANTERIOR PITUITARY HORMONE IN THE BLOOD OF GYNECOLOGIC PATIENTS*

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THE advances of the past few years in our knowledge of the hormones concerned with the function of the female sex organs have paved the way to a new method of approach in dealing with the functional diseases of these structures. Although it is impossible at the present to estimate to what extent this will prove of clinical value and to what degree these findings will be applicable to our anatomic knowledge, it is very necessary to obtain as soon as possible a large number of observations from this new standpoint.

The recent investigations which have been carried out on the female sex hormones have been directed along three main lines of inquiry—the anterior lobe of the hypophysis, the ovarian follicular hormone, and the corpus luteum hormone—and these have unfortunately been kept so distinct that it is difficult to coordinate them and appreciate their full value. The diagram† (Fig. 1) (based on the experimental work of Evans, Smith, Engle, Aschheim, Zondek, Allen, Doisy, Frank, Loeb, Loewe, Parkes, Corner, Hisaw, and numerous others) is an attempt to represent the most salient features of the problem and illustrate the interaction of these important factors. It of course only seeks to explain a few fundamental facts which are fairly well proved,

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†Since this paper was written a similar but more elaborate diagram by Zondek (Klin. Wchnschr. 9: 245, 1930) has appeared.

and necessarily leaves out much that not only is important but requires further elucidation.

It is seen that from the anterior hypophysis originate three hormones, or at least, the substance of this gland can produce three distinct effects, and of prime interest to us are those two which directly affect the ovary. In the first place we find the influence of the anterior

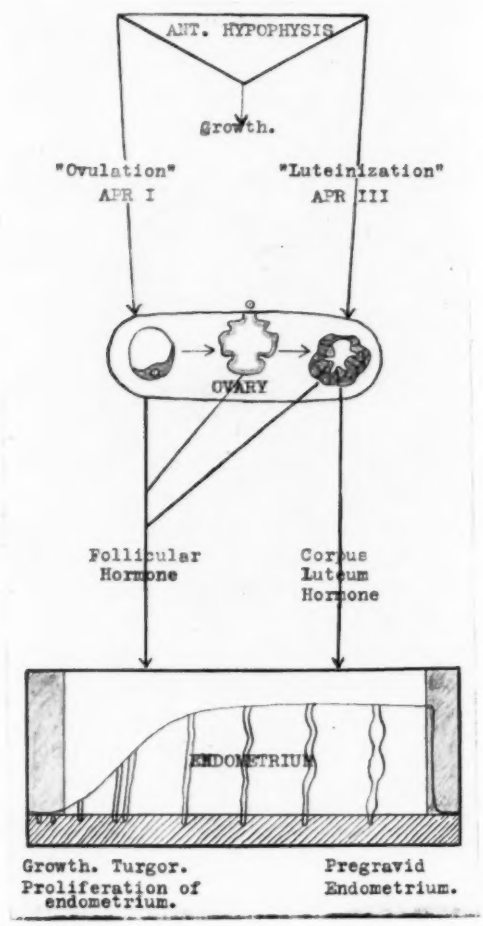

Fig. 1.—Diagram illustrating the interaction of the important hormones concerned with menstruation and pregnancy. (The representation of the endometrium is after R. Schroeder.)

pituitary "ovulation hormone" in the development of a graafian follicle in the ovary and the consequent elaboration of the "follicular hormone" which in turn stimulates the uterus to growth, turgor, and the proliferation of the basal layers of the endometrium. The second anterior pituitary factor coming into play then causes a "luteinization" of the cells of the ruptured follicle and the formation of a second

ovarian (corpus luteum) hormone which acts on the endometrium to produce the changes characteristic of the premenstrual phase, or in the case of gestation, to decidual transformation.

If this theory should prove correct it is readily seen how any disturbance altering the function of one or more of these hormones may manifest itself by serious pelvic disorders. The possibility is well illustrated by the anatomic findings in conditions such as glandular hyperplasia endometrii and the clinical history of menstrual irregularities accompanying hypo- and hyperpituitary dysfunctions. It would seem of vital importance, therefore, as Zondek[1] has emphasized in a recent article, to make "functional" as well as "anatomical" studies of our patients on the basis of these discoveries. A simple method of partly accomplishing this has been found in the determination of the presence of large amounts of these hormones in the blood, urine or tissues of women with certain pelvic disorders. Valuable contributions on the demonstration of follicular hormone in various normal and abnormal conditions have already appeared (Frank and Goldberger, Loewe, Aschheim and Zondek, Siebke, and others), and although little is known as to the corpus luteum hormone it would seem as though this information may be forthcoming before long. The development of a test for the presence of the anterior pituitary hormone (or hormones) by Aschheim and Zondek has led to an important biologic reaction for the diagnosis of pregnancy. It is possible, however, that a different interpretation of this procedure may enable it to be used for the study of certain pelvic diseases, and the present study is directed to the analysis of some observations on this question.

TECHNIC

The technic of the test used in this study has been described in two previous communications (Fluhmann[2, 3]), and is based on the "pregnancy test" of Aschheim and Zondek.[4] It consists in obtaining, under sterile precautions, from 15 to 20 c.c. of venous blood from the patient to be examined. This is then allowed to stand or is centrifuged and from 3.0 to 5.0 c.c. of the clear serum are injected subcutaneously, twice daily in from 0.5 to 1.0 c.c. doses, into an immature female white mouse. (In view of the study by Engle and Rosasco[5] the immaturity is determined by the age and not by the weight of the mice, and they are used only if between seventeen and twenty-two days old.) In the case of a positive result, the vaginal introitus of the mouse is established by the fourth or fifth day and the animal is then killed and its ovaries fixed in Zenker's solution. They are embedded in paraffin and serial sections are made and studied. The conditions which indicate the presence of anterior pituitary hormone are grouped into three categories by Aschheim and Zondek, as follows:

Anterior Pituitary Reaction One (APR I).—(The "ovulation" reaction): The ovaries show the presence of normal ripening follicles, while if autopsy is delayed normal corpora lutea are seen and ova may be found in the fallopian tubes.

APR II.—(The "hemorrhagic cyst" reaction): The ovaries grossly show the presence of fine reddish dots, which correspond to hemorrhages into normal and abnormal follicles, and are apparently due to the intense congestion set up by the

hormone. In the present study the finding of this reaction is not charted, since it is invariably an accompaniment of reaction III and does not seem to yield any important additional information. In the diagnosis of pregnancy, however, it is of considerable value as it is readily perceptible grossly.

APR III.—(The "luteinization" reaction): In this case the ovaries present a process of luteinization of the cells of follicles and the formation of abnormal structures resembling corpora lutea in which ovulation has not occurred and the ovum remains imprisoned. It is also worthy of note that these structures occur much sooner than normal corpora lutea would be formed following ovulation and in one instance they were noted forty-eight hours following the first injection of serum from a patient with an early pregnancy.

The changes in the vaginal mucosa which accompany the various processes seen in the mouse ovaries are also of interest and have been studied in a smaller series in view of the recent observations of Wiesner. In the case of APR I, the vaginal mucosa shows the cornification characteristic of the stage of estrus, and is identical to the change elicited by the ovarian follicular hormone in spayed mice (Allen-Doisy test). On the other hand, when APR III is obtained alone the vaginal mucosa is altogether different as it is composed of tall cylindrical cells at the surface ("pseudopregnancy" of Evans and Long; "mucification" of Wiesner and Patel), and is similar in appearance to the mucosa of a mouse during gestation.

RESULTS

The present report deals with the results obtained from the examination of 319 patients, and includes the cases mentioned in the two preliminary communications (Table I).

Some difficulty has been experienced in grouping the patients on a clinical basis, since a number of important factors have been taken into consideration and in some cases the same individual would seem to belong to more than one category. However, it was apparent that all those cases having gross anatomic lesions in the pelvis should be classed separately, while women during pregnancy, postpartum, the menopause, and following castration fell into definite single groups. The patients with functional diseases manifested by disturbances of menstruation offered most difficulty and defied any systematic classification based on such features as obesity, atrophy of the uterus, hirsutes, duration of symptoms, etc. It was therefore deemed advisable to group them purely on the basis of their symptoms as regards menstruation, and the final classification was as follows:

A. Normal controls.
B. Miscellaneous gynecologic diseases.
C. Pregnancy and postpartum.
D. Castration:
   a. Operative extirpation of the ovaries.
   b. Postradiation amenorrhea.
E. Menopause and postclimacteric.

F. Disturbances of men on during active sexual life:
1. Functional amenorrhea.
2. Irregular menses.
3. Dysmenorrhea with regular menstrual cycle.
4. Regular but scanty menses.

A. NORMAL CONTROLS

The patients used as controls for this series consist of 36 women giving a history of normal menses. Pelvic examination in each case revealed no extensive pathology beyond possibly a mild infection of the cervix, an uncomplicated retroversion, a Bartholin's cyst, etc. As regards the menstrual cycle, 3 patients were menstruating at the time the blood was obtained, in 7 menstruation was expected within one week, in 5 the periods had finished a few days before, and in 21 the patients were in the intermenstruum or the exact date of the last menstrual period was not obtained. In every instance a negative reaction was found.

TABLE I. TOTAL RESULTS

	APR I	APR III	APR I-III	NEG.	TOTAL
Normal controls	0	0	0	36	36
Miscellaneous gynecologic diseases					
a. Before menopause	2	0	0	34	36
b. Postclimacteric	3	0	0	9	12
Normal pregnancy	10		48	14	72
Postpartum	0	0	0	12	12
Abnormal pregnancy	0	0	0	9	9
Operative castration					
a. Within 3 months postoperative	8	0	0	11	19
b. After 3 months	11	0	0	2	13
Radiation castration	8	0	0	6	14
Menopause	7	0	0	15	22
Postclimacteric	4	1	0	2	7
Amenorrhea (over 6 months)	4	1	4	5	14
Amenorrhea (short duration)	0	0	0	7	7
Irregular menses					
a. Shortened intervals	2	1	0	7	10
b. Delayed menses	0	0	0	15	15
c. Totally irregular	0	0	0	7	7
Dysmenorrhea; regular cycle	3	0	0	6	9
Scanty menses; regular cycle	0	0	0	5	5
Total					319

B. MISCELLANEOUS GYNECOLOGIC DISEASES

A total of 48 patients with various anatomic lesions of the pelvis were examined, and the results are charted in Table II. Owing to the findings in the menopause group, it was deemed advisable to classify separately the patients who had passed the climacteric (as manifested by their age and amenorrhea of over one year's duration). It is thus seen that only two of the women before the climacteric gave a positive reaction (APR I), but it must be stated that both were over forty

years of age and thus probably represent an early menopause effect. It is worth noting that five patients with glandular hyperplasia endometrii (three of whom were over forty years of age), and three with a previous hysterectomy and the conservation of at least one ovary, gave negative results. It is also of interest, since other workers have reported a number of positive findings in patients with malignant tumors, that only one of the cancer patients gave an APR I, in spite of the fact that eight of the cancer patients were well past the climacteric.

TABLE II. MISCELLANEOUS GYNECOLOGIC CONDITIONS

	BEFORE MENOPAUSE			POSTCLIMACTERIC		
	APR I	NEG.	TOTAL	APR I	NEG.	TOTAL
Acute salpingitis	0	4	4			
Chronic salpingitis	1	13	14			
Fibromyoma uteri	1	3	4	1	1	2
Total hysterectomy	0	3	3			
Dermoid cyst ovary	0	1	1			
Serous cystadenoma ovarii				1	0	1
Glandular hyperplasia endometrii	0	5	5			
Carcinoma cervicis uteri	0	5	5	1	5	6
Carcinoma ovarii				0	1	1
Carcinoma of the rectum				0	1	1
Tumor labium majus				0	1	1
Total	2	34	36	3	9	12

C. PREGNANCY AND POSTPARTUM

In my first communication[2] it was stated that 48 patients representing various stages of pregnancy had been examined with 13 negative findings while 8 patients had yielded APR I alone, and APR III had been noted 27 times. Twenty-four additional patients must be reported now, but with a much higher percentage of positive results, since APR II or III, with or without I, was found 21 times, APR I alone twice, and only one negative. The total figures for 72 patients during pregnancy would now be 14 negative and 58 positive, 48 yielding APR III (with or without I or II) and 10 APR I alone.

Twelve postpartum patients gave negative results, and the blood had been taken as early as forty-eight hours and as late as six months after delivery. Three women with ectopic gestations, one with a missed abortion of six months' duration, and five with incomplete abortions or postabortum bleeding, also proved negative.

D. CASTRATION

A total of 32 patients who had had a previous bilateral oophorectomy have been examined, and in 19 cases the blood serum gave a positive APR I. The majority of these patients had been operated upon for extensive pelvic inflammatory disease and they were seen at

varying periods, a positive reaction being found as early as nine days and as late as fourteen years after operation. A few gave a negative test a short time after operation but became positive later, and this may offer an explanation for a large number of the negative results. If the patients are divided into two groups according to the length of time elapsed since castration, it is seen that only 8 positive were found in 19 women examined during the first three months, but there were 11 positive out of 13 who were seen at longer intervals after operation. This is also in keeping with the histologic studies of Rössle who found that whereas castration changes were sometimes present four to five days after operation they invariably were not apparent before a considerable length of time had elapsed.

In addition to the patients who had had an operative extirpation of the ovaries, 14 women who had received massive doses of radium or x-rays to the pelvis were also examined. Of these, 8 showed the presence of anterior pituitary hormone (APR I) in the blood, while it was not demonstrated in six others. In these cases, with one exception, the examinations were conducted at periods of longer than three months from the time of radiation.

E. MENOPAUSE AND POSTCLIMACTERIC

Twenty-two patients representing the climacteric period have been examined, and a positive APR I was obtained seven times. The criteria used to determine whether a woman was in the menopause or not were her age plus menstrual irregularities and the common manifestations of hot flushes, dizziness, and headaches. The menstrual irregularity complained of generally consisted of too frequent and too profuse periods. Only one of the patients with anterior pituitary hormone in the blood was less than forty years of age, but a climacterium precox was observed in four of the negative group.

On the other hand, the examination of the blood of 7 patients who had definitely passed the climacteric, as manifested by amenorrhea of from one to six years' duration, gave positive results in five instances. Of these, four showed APR I alone, and one APR III. It must also be observed that a positive APR I was obtained from the examination of the blood of three patients who had passed the menopause and in addition had an anatomic lesion in the pelvis (fibromyoma uteri; serous cystadenoma ovarii; carcinoma cervicis uteri).

At this point attention must be drawn to the fact that with the exception of pregnant women a positive test has not been obtained in girls of less than twenty years of age. This includes one with a functional amenorrhea, eight with irregular menses, and one with dysmenorrhea. These results draw a sharp contrast between menstrual disturbances of the menarche and of the menopause.

F. DISTURBANCES OF MENSTRUATION DURING ACTIVE SEXUAL LIFE

This group comprises 67 patients with various menstrual disturbances. Each of these women was carefully examined and no gross pathology to account for any of the symptoms could be demonstrated, while the possibility of pregnancy was excluded by repeated examinations whenever this was indicated.

1. *Functional Amenorrhea.*—This group has been subdivided into two divisions. First, are 14 patients who complained of periods of amenorrhea persisting for longer than six months. Owing to the importance of this condition from a functional standpoint, a list of the patients with a few details of their histories is given in Table III. It is seen that in every instance there is evidence of a very serious disturbance and with only two exceptions there was either an accompanying atrophy of the uterus, the presence of obesity, or both. In 10 cases also there was a history of preceding menstrual irregularities or the condition was primary. Nine of the 14 gave positive tests for the presence of anterior pituitary hormone in the blood, 4 showing APR I alone, one APR III alone, and 4 a combination of APR I and III.

In contradistinction to this group are 7 women who complained of short periods of amenorrhea, although their menses had previously been regular and normal. The duration of the symptom varied from six weeks to five months, and most of the patients came to inquire if they were pregnant. The examination of the blood in every instance proved negative, a fact which is of great interest since the test is most commonly used for the diagnosis of pregnancy and this is the type of patient in whom the differential diagnosis is most important. In two cases the blood showed large amounts of ovarian follicular hormone thus corresponding to the "hyperhormonal amenorrhea" mentioned by Zondek.

2. *Irregular Menses.*—This category has been subdivided into three smaller groups according to the type of irregularity demonstrated.

a. Shortened Cycle: Ten patients complained that their menstrual periods appeared at shortened intervals every two to three weeks. In only one instance (negative test) was any atrophy of the uterus found, and in none was a note made of obesity. Two of this group gave an APR I, and one an APR III. The menses were described as profuse in two of the positive cases, while in the third they were scanty and accompanied by dysmenorrhea.

b. Delayed Menses: In contradistinction to the first group, fifteen patients complained of prolonged intervals between their periods and in some instances menstruation occurred only every few months. In this division the examination of the patients showed evidence of extensive disturbances. In 7 cases the patients were obese, in two there was a hypoplasia of the uterus, and in two, hirsutes. Seven complained of

TABLE III. FUNCTIONAL AMENORRHEA OF OVER SIX MONTHS' DURATION

PATIENT	APR TEST	AGE	GRAV.	DURATION AMENORRHEA	SYMPTOMS PRECEDING AMENORRHEA	OBESITY	HYPOPLASIA UTERI	B. M. R.	REMARKS
M. M.	I	27	1	4 years	Sudden onset	Yes	No	– 8	
D. K.	I-III	20	0	7 years	Primary	No	Yes?	– 2	
M. G.	I-III	25	0	18 months	Menses became scantier for 6 months	Yes	Yes	–20	Thyroidectomy 9 years before
P. E.	I	24	2	17 months	Sudden onset		Yes		
F. E.	I-III	33	6	8 months	Scanty periods for 3 years	Yes	No	– 8	
M.	III	32	0	3 years	Irregular menses (every 6 mo. or more) for 11 years		No		
N.	I-III	32	0	8 months	Irregular (every 6-8 months)	Yes	No		
H. V.	I	32	0	17 months	Irregular with amenorrhea of 3-12 months since menarche	No	Yes		Exam. of blood 5 mo. before was negative
R. P.	I	29	3	8 months	Sudden onset	Yes	No	5	
M. A.	Neg.	36	0	8 months	Sudden onset	No	Yes		Patient has cramp-like pains each mo. but no flow
F. M.	Neg.	21	0	14 months	Irregular (every 30-60 days) since menarche	Yes	Yes	–11	
V. C.	Neg.	26	1	7 months	Sudden onset	No	No	–21	
C.	Neg.	17	0	18 months	Patient has only had five irregular, scanty periods	No	Yes	– 3	Epileptic
K.	Neg.	35	0	5 years	Menses always delayed	No	Yes		

scanty menses, three of marked dysmenorrhea, and two of hot flushes. The examination of the blood serum was negative in every case.

e. Totally Irregular Cycle: In 7 patients the history obtained showed a total irregularity in the occurrence of the menses, the interval at times being shortened, in others prolonged. An atrophy of the uterus was noted twice, and in two other instances the menses were scanty. No positive results were found in this group.

3. *Dysmenorrhea.*—The study of patients with dysmenorrhea accompanying a regular menstrual cycle was approached with much interest owing to the reports of improvement following x-radiation of the hypophyseal area. Nine women belonging to this category have been examined, and an APR I was obtained three times. Scanty periods were complained of in addition to the dysmenorrhea by two patients, but the test proved negative in both instances.

4. *Scanty Menses; Regular Four-Week Cycle.*—Since the onset of scanty menses at times precedes the occurrence of long periods of functional amenorrhea, it seemed of importance to examine patients who presented this symptom but were still having an otherwise normal period each month. Five such women have been seen, but in each case the blood was negative. The duration of the symptom varied from seven months to as long as eight years. An atrophy of the uterus was noted once, and a marked recent increase in weight in two other instances. Three patients were multigravidae, and two nulligravidae.

DISCUSSION

The Aschheim-Zondek test is to be regarded as quantitative as well as qualitative, and the difficulties of biologic assay of hormones of this type are well known. It is readily seen that the test is not delicate enough to demonstrate the anterior pituitary hormone which is present in the blood under normal conditions, but on the other hand we do not know how much of an increase in the amount of the substance of the anterior hypophysis must exist in the blood before it can be demonstrated in this manner. There are also undoubtedly certain individual variations in the reactions of each mouse, and since it is impossible to inject a large series of these animals with the blood from the same patients, this may lead to further error. Thus, a number of patients in whom there is really a considerable increase in the amount of the hormone might yield negative results. However, a positive reaction is to be considered as clear evidence of a hypersecretion of anterior pituitary hormone, and the resultant errors on the negative side must be offset by the analysis of large series of patients.

Since previous studies with the Aschheim-Zondek reaction have almost without exception been done for the sole purpose of developing a test for the early diagnosis of pregnancy, and urine instead of blood has been examined, it is difficult to find other results in the literature which compare directly with those of this

series. Fels[6] examined the blood of a small number of patients and obtained positive results in 30 out of 38 pregnant women, and negative in 9 with normal menstruation. In their original study, Aschheim and Zondek[4] found APR I in the urine of one normal woman, in one case of acromegaly, in two cases of myxedema, in one case of hyperthyroidism, in two cases of severe pelvic inflammation, in one case of amenorrhea associated with a papillary cystadenoma, in three cases of functional amenorrhea, and in seven cases of genital carcinoma. In a recent article, however, Zondek[1] announces that he has found APR I in some cases following the menopause and after bilateral oophorectomy. Ehrhardt[7] states that he has found APR I in similar groups of patients and also following castration, in climacterium precox, in the early stages of the menopause, and in the presence of lipoid necrosis. Wagner[8] in 151 cases of amenorrhea did not find a single APR II or III. Schmidt[8] obtained positive results from the urine of two out of 11 patients with carcinoma, and negative in 5 with amenorrhea, two with a hypophyseal tumor, and one with acromegaly. Karg[8] obtained 15 negative results in patients with carcinoma and postradiation amenorrhea. Hannan[9] with his modification of the test found positive results from the examination of the urine of some patients with secondary amenorrhea, fibroids, genital carcinoma, exophthalmic goiter, and during the menopause. Solmes and Klopstock[10] emphasize the importance of doing the test as a guide to the therapy to be employed in cases of amenorrhea and the menopause and divides them into "hypo-" and "hyperhormonal" groups. There has, however, apparently been no systematic effort to analyze the findings from this test in nonpregnant women.

The first main conclusion which must be drawn from the results obtained in this series is that a positive test does *not* occur in women with normal menstruation, and that there is always a marked endocrine disturbance whenever it does occur.

The most outstanding group of those giving a positive result is made up of women during gestation, and the accuracy of the Aschheim-Zondek test when used for the diagnosis of pregnancy is now generally recognized. The reaction in the test animal in these patients is characterized by the occurrence of APR II and III, and this is a most interesting feature because we find a tremendous production of the anterior pituitary "luteinization" hormone just at the time when the ovary contains a persistent corpus luteum and there is an absence of ovulation.

The hypersecretion of the anterior lobe during pregnancy is in keeping with the histologic changes of the gland which were described by Erdheim and Stumme[11] and which consist mainly of a marked proliferation of the "Hauptzellen" or chromophobe cells. These changes have been attributed to a direct stimulation of the anterior hypophysis by some substance found in the placenta (Berblinger,[12] Adachi,[13] Lehmann[14]), and which may be ovarian follicular hormone (Baniecki[15]). However, considerable evidence has been adduced that the placenta produces or stores a substance which stimulates the ovary in the same manner as the anterior lobe hormone (Collip[16]) and this is a possible source for the large amounts found in the blood during pregnancy.

In the next important group of women with anterior pituitary hormone in the blood, we find a hyperactivity of the anterior lobe due to a complete removal of ovarian influence, and in this case the characteristic finding is an APR I, namely a predominance of the "ovulation" hormone. In the first place are women whose ovaries have been completely extirpated by operation or destroyed by intensive radiation. The hypersecretion of the anterior lobe in these cases is again in keeping with the gross hypertrophy, and the histologic changes which have been noted by a number of authors (Tandler and Gross,[17] Kon,[18] Kolde,[19] and Rössle[20]) consist in the human of an increase in the eosinophilic cells and the appearance of a much-debated type of cell, the "castration cell." Evans and Simpson[21] also believe that these changes are accompanied by a progressive storage of the hormone in the gland, and this is further borne out by the fact that the use of anterior pituitary gland implants from castrated rats provokes reactions in the ovaries of the test animals many times greater than similar implantations of normal hypophyseal tissue (Engle,[22] Evans and Simpson[23]). There is as yet no definite information as to the removal of which ovarian factor is responsible for the profound changes in the anterior lobe. Certain as yet incomplete experiments (Fluhmann and Kulchar) point to the fact that the ovarian follicular hormone is not altogether the one at fault, for the constant administration of this substance to castrated rats over a period of three months failed to prevent the appearance of the characteristic "castration" cell.

In addition to those women who have had an operative or radiation castration, it is felt that two other types of patients belong to the same category from an etiologic standpoint, namely those with a prolonged functional amenorrhea and those in the postclimacteric period. Ovarian activity has completely ceased following the menopause, and the fact that the amenorrheic patients who yield a positive test give evidence of a prolonged and intense disturbance lead one to assume that they also may have a complete deficiency of ovarian function. The existence of a positive test in patients with prolonged periods of functional amenorrhea would thus suggest a poor prognosis, although not necessarily a hopeless one. This was illustrated by one patient, aged twenty-five, who gave a strong APR I after eighteen months' amenorhrea. Following treatment she had a scanty period, and the examination of the blood on two occasions during the succeeding two months proved negative. It will be of importance to determine if the amenorrheic patients with APR I correspond in general to the group described by Frank[24] as not showing a cyclical appearance of ovarian follicular hormone in the blood.

Since a *total deficiency* of ovarian function profoundly affects the anterior lobe and results in a massive production of its hormone, an important question arises as to whether a similar condition may super-

vene as a result of a "hypofunction" of the ovary. As applied to a complicated structure such as the ovary, which is constantly changing and produces different hormones at different stages, this term is somewhat indefinite and cannot be used as freely as it is applied to glands such as the thyroid or the adrenal. However, it is in general usage and applied to disturbances which are manifested by scanty menses, amenorrhea, or delayed menses. This conception of course arose at the time when the ovary was considered as the prime factor in the occurrence of menstruation, but in view of the recent work pointing to the anterior hypophysis as the "trophic" (Hofbauer) or "motor" (Zondek and Aschheim) center of ovarian activity, it is readily seen that a primary "hypopituitary" with a secondary "hypo-ovarian" condition forcibly enters the picture. With the exception of those patients who have long-continued periods of amenorrhea and in whom it is felt that there is possibly a complete cessation of ovarian function (whether temporary or permanent), no patient of this series who could be said to have an ovarian "hypofunction," as manifested by hypomenorrhea, delayed menses or short periods of functional amenorrhea, gave a positive anterior pituitary hormone reaction.

There now remain a number of patients in whom APR I has been obtained, but who present an altogether different clinical picture. In the first place, there are women in the early stages of the menopause whose chief complaint is irregular menstruation with shortened intervals; secondly, a small number of younger women also with too frequent menses; and finally, patients with dysmenorrhea. Since the number of observations in the last two groups is very small, it is felt that any conclusion is scarcely justified. However, it is very remarkable that whereas the patients whose menses are scanty or persistently delayed do not give positive reactions, a few have been obtained where the periods occur more frequently than usual, and it is also noted that the menstrual flow in some of these cases was prolonged and profuse. It would seem as though in these instances we may be dealing with conditions the exact reverse of the "hypofunction" group discussed in the preceding paragraph, namely, a primary "hyperpituitary" with a secondary "hyperovarian" condition. This conception cannot be held by any means as established, but it must be considered as a strong possibility, and it is further strengthened by the reports of improvement in the occurrence of the menses or the diminution of dysmenorrhea following x-radiation of the hypophyseal area.

SUMMARY

1. The recent advances in our knowledge of the physiology of the female sex organs point to the importance of studying pelvic diseases from a "functional" standpoint. This may be partly accomplished by

determining the presence or absence of unduly large amounts of anterior pituitary and ovarian follicular hormones in the blood or urine.

2. The presence of large amounts of the anterior pituitary sex hormone (or hormones) in the blood is readily determined by a method based on the Aschheim-Zondek "pregnancy test," and the results of the examination of 319 patients are reported in this study.

3. The test proved negative under the following conditions:

a. At any stage of the cycle in women with a normal menstrual history.

b. In patients less than forty years of age with anatomic pelvic lesions, such as carcinoma cervicis uteri, fibromyoma uteri, pelvic inflammatory disease, glandular hyperplasia endometrii, etc.

c. In patients with "hypo-ovarian" conditions, as manifested by short periods of amenorrhea, scanty regular menses, or persistently delayed menses.

4. The patients with positive results could be classed into three categories:

a. During pregnancy, when the test is characterized by the "haemorrhagic cyst" and "luteinization" reactions.

b. In the presence of a total ovarian deficiency, when the test gave mainly the "ovulation" reaction. This group was represented by women following a complete operative extirpation of the ovaries, after radiation castration, and after the menopause. Some patients with prolonged periods of functional amenorrhea also probably belong to this category.

c. A group composed of women in the early stages of the menopause with irregular profuse periods, and a small number of younger patients with irregular (too frequent) menses or severe dysmenorrhea. The test when positive showed the "ovulation" reaction. The etiologic factor is not known, but the possibility that the symptoms may be the result of a "hyperpituitary" condition must be considered.

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BENIGN UTERINE BLEEDING, WILFRED SHAW'S GROUPS

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NEW views concerning the pathology and physiology of uterine bleeding should attract considerable attention. In his paper entitled "Irregular Uterine Hemorrhage" published in *The Journal of Obstetrics and Gynecology of the British Empire*, **36**: No. 1, 1929, Wilfred Shaw has offered some very interesting observations. Two hundred cases of irregular uterine bleeding, that is, cases without evident pathology, such as carcinoma, leiomyoma, polyp, etc., have been studied intensively by him and have been divided into definite groups. The microscopic pathology of the uterus, endometrium and ovary has been carefully studied and reported. Of these 200 cases he has been able to group about 82.5 per cent and to point out to his satisfaction some of the reasons for their bleeding. The remaining 17.5 per cent he could not group or account for their hemorrhagic diatheses.

Part of his paper is given over to a survey of the history of the study of uterine bleeding and to the various theories of other investigators. Certain of their ideas he accepts and others discards. He then proceeds to the examination of material from patients who have borne children, in an attempt to rule out the so-called "subinvolution theory" of abnormal uterine bleeding. His own conclusions best show his views in regard to this theory and also to the "uterine fibrosis theory." A summary of his study in his own words follows:

"The present-day view of the etiology of irregular uterine hemorrhage attributes the majority of cases to subinvolution changes in the vessels of the uterus. . . . The involution of the arteries of the puerperal uterus is through a granular atrophy of the muscle wall and caliber of the lumen of the vessels is reduced by means of a proliferation of the subendothelial tissues.

"The elastic tissue content of the uterus is increased after each pregnancy. Elastic tissue is deposited around the vessels, particularly around the veins, in the media and internal elastic lamina of the arteries and also between the muscle bundles of the myometrium. . . . The increase in the amount of elastic tissue is to be regarded as a physiologic process and there is no reason to believe that the deposit of elastic tissue is in any way determined by subinvolution changes in the uterus. . . . It has been shown that the amount of elastic tissue in the uterus depends solely upon the parity of the patient and is independent of local conditions

in the pelvis. Cases in which a large amount of elastic tissue can be demonstrated have been obtained from patients who have suffered from no menstrual disturbance whatsoever. It is, in consequence, concluded that irregular uterine hemorrhage is in no way determined by the amount of elastic tissue present in the uterus. No association between subinvolution and irregular hemorrhage has been found. . . .

"No evidence has been found of the existence in menstruating women of a condition in which the muscle cells of the uterus are replaced by fibrous tissue. For these reasons it is maintained that cases of irregular uterine hemorrhage should not be attributed either to subinvolution or to a fibrotic state of the myometrium.

"The uteri of women who have borne a large number of children are firmer than the uteri of nulliparae through the deposit of elastic and connective tissue."

Shaw's most important contributions to the study of uterine hemorrhage are his grouping of cases and his recognition of certain ovarian disturbances. His four primary divisions are quite distinct and may be used in clinical practice. The irregular hemorrhage he believes is due to a disturbance of the physiology of the ovary which is in its turn probably controlled by something else at present unknown. A résumé of the four groups and the essential characteristics of the history and pathology of each group is given below.

Group I. The so-called "metrophathia hemorrhagica" of Schröder accounts for 26.5 per cent of the cases. Most of these patients are between forty-one and fifty years of age but occasionally a few are met under thirty. The history of the irregular hemorrhage is very important. The monthly periods have been normal and regular, when suddenly a period is skipped. The next period may start off normally but at the end of the usual time the bleeding continues either more or less severe and may last from three to eight weeks. The flow is frequently very severe but may be small in amount. The period of amenorrhea is not always essential and occasionally is not present in the history but a continued period of vaginal bleeding, either following a succession of normal periods, or a succession of very large and prolonged periods with a normal interval, is essential. In 50 per cent of these cases, however, a very definite history of the amenorrhea phenomenon was obtained. Pelvic examination shows a uterus normal in size or slightly larger than it should be at this time of life, usually smooth and symmetrical although an occasional fibroid may occur. In one or both vaults a slight enlargement of the ovary may be felt which suggests the presence of a small ovarian cyst. At operation, when the patient is curetted, a very large amount of thick, dark red endometrium is obtained. The uterus is found to be large and symmetrical and an ovarian cyst is present usually in one but occasionally in both ovaries. This cyst is usually about 1 inch to 1½ inches in diameter and contains a clear fluid and resembles a follicle cyst. Microscopically most cysts prove to be cystic ripening follicles. The remainder of the ovarian tissue is small, corrugated and definitely atrophied. No fresh or even recent corpora lutea can be found. Macroscopically the endometrium is thick, red, purplish, of the typical polypoid type and scattered throughout the endometrium areas of necrosis may be found which probably account for some of the bleeding at least. (Areas of necrosis of this type have been recently reported by Fluhmann.[3]) Microscopically there are areas of disintegration with cystically dilated glands in the superficial layer. The basal layer shows a hyperplasia of the glands and stroma. Very full capillaries and extravasated blood are also present. This type of uterine bleeding shows an association between uterine and ovarian dysfunction, as both the endometrium and ovaries are disturbed. The

uterine endometrium suggests a hyperactivity in its part and the ovaries appear shrunken and atrophied and presumably of diminished function.

Shaw's interpretation is about as follows: that the abnormal endometrium acts upon the ovaries to inhibit follicle ripening or formation of the corpus luteum and that the ovaries produce the toxin that causes disintegration of the premenstrual endometrium of normal menstruation and so disintegration of the superficial layers of the polypoid endometrium occurs and thus hemorrhage.

Shaw suggests nothing new as a mode of treatment, relying upon curettage in the young and either radium, x-ray, or hysterectomy in the older group. An occasional cure has been noted following careful and thorough curettage, as though the removal of the polypoid endometrium relieved the ovary from uterine control.

Group II. This group Shaw calls the "epimenorrheal group" and it accounts for about 36 per cent of the total number of cases. This type occurs in women of all ages but generally from forty to fifty years of age. It is the most common form of benign bleeding and the history given by these patients is quite typical. A normal menstrual cycle is suddenly changed to a cycle of two weeks, slightly more or less. With the new interval the amount of blood lost at the period is greater and the flow lasts longer. Most of the patients have borne children, a fact of some importance. Pelvic examination shows a symmetrically enlarged uterus with occasionally a fibroid, the vaults are negative. On curetting the patient the endometrium is found to be thicker than normal but may be reduced in amount. Macroscopically the uterus is symmetrically enlarged and the ovaries are small, corrugated and atrophied but hemorrhagic cystic follicles are present. Microscopically there is no evidence of infection in the uterus, the surface epithelium is normal and the glands are of normal size and contour. No cystically dilated glands are found and there are no areas of necrosis or disintegration as seen in Group I. The stroma, however, is very edematous and hyperemic and this is a nearly constant finding. The excessive hemorrhage at the period may be explained by the hyperemia of the stroma. Microscopically in the ovary too many corpora lutea are found. In a considerable percentage of cases two corpora lutea of the same age were present. These corpora lutea are of normal appearance both macroscopically and microscopically. In one case Shaw reports that, although a removed ovary containing a corpus luteum corresponded to the sixteenth day of a normal cycle and represented the condition two or three days after ovulation, this particular ovary had been removed on the eleventh day of a fourteen-day cycle and that therefore ovulation had occurred upon the ninth day, which is five days earlier than it should be. He therefore concludes that ovulation takes place earlier than normal and that the ovarian rhythm is too frequent. He believes that this ovarian dystrophy then explains the too frequent periods. The corpus luteum of the preceding cycle, though not abnormal, had not retrogressed sufficiently and the number of follicle cysts were more than normal. The edema and hyperemia of the endometrium is explained by the too great ovarian activity and the increase in bleeding by the former.

The treatment that he advocates is no different, curettage, x-ray, radium, and hysterectomy being suggested.

Group III. This group Shaw names the "hypomenorrheal group" and it comprises 8 per cent of the total. The ages of the patients are from forty to fifty years with an occasional younger patient. Here the menstrual cycle is increased from thirty-five to forty-two days, and there is an increase in the amount of blood lost and in the length of the flow, or the cycle is irregular from three to six weeks with the same excessive loss of blood. The uteri are either slightly enlarged or normal in size, occasionally containing a fibroid. Macroscopically the ovaries are grossly pathologic, being very hyperemic, with large follicular hematomas. The

endometrium is not abnormal in its cyclic changes. An occasional hyperplasia of the endometrial glands is present and the endometrium shows great edema and hyperemia. Shaw feels that the numbers in this group are too small to draw any conclusions but feels that ovarian disturbances account for the irregular ovulation and flowing. The hyperemia of the endometrium probably accounts for the increased hemorrhage and the hyperemia and edema may be accounted for by ovarian dysfunction.

The treatment is the same, curettage in the younger patients, and x-ray, radium, or hysterectomy in the older.

Group IV. This group Shaw designates as the "metrorrhagic type" and it comprises 5.5 per cent of the total. The average age of this group is from thirty to forty years. The patients have normal periods with a regular rhythm, but between their periods a vaginal discharge occurs varying from true blood to a pinkish discharge. This discharge stops before the onset of the next period and is occasionally associated with severe pain in the back. The flow is not excessive but it is continuous and is therefore very disagreeable. The patients are occasionally very highly sexed. The uterus shows no abnormality in size or shape but the ovaries are enlarged and hyperemic. There is a true hyperplasia and hypertrophy present in these ovaries suggesting a decided hyperactivity. The endometrium shows normal cyclic changes, but enormous hyperemia. This hyperemia is the essential feature, although edema is also present. The intermenstrual hemorrhage is probably due to oozing from the intensely hyperemic endometrium, and it is not similar to menstrual flow. Shaw believes that the overactive ovaries are responsible for the greatly hyperemic endometrium.

The treatment suggested is the same as in the other groups.

Group V. A few cases of endometritis were studied and included in the series. These were 6.5 per cent of the total number. True inflammatory lesions were found scattered among the superficial and middle layers of the endometrium. In the acute stage there is great infiltration of the stroma with leucocytes and round cells. Normal cyclic changes are active in the endometrium as long as the ovaries are not interfered with. The presence of plasma cells in these inflammatory conditions is essential to make the diagnosis, especially of the chronic cases. Acute endometritis is characterized by greatly increased flow, one or two months at a time, with a large amount of purulent discharge. Acute inflammation may follow typhoid fever, pneumonia, puerperal sepsis, gonorrhea, etc. The chronic type is usually found in uteri that contain infected polyps, fibroids, carcinomas, etc. In all cases typical inflammatory changes as seen in other organs of the body in inflammatory processes are found. The treatment of the acute cases is expectant wherever possible.

In 17.5 per cent of the 200 cases no explanation for the disturbed function could be found. Shaw's study, then, has been able to point out satisfactorily four groups, and, including the endometritis group, five groups of cases with irregular uterine hemorrhage. Cases in individual groups have similar histories, similar physical findings and the pathologic histology is definite for each group. It is possible now to view patients with abnormal bleeding more clearly and understandingly.

DISCUSSION

Before an appreciation of Shaw's work is possible it is necessary that the probable behavior of the ovary and endometrium throughout a normal menstrual period be understood. The correct time of ovulation and of corpus luteum influence is important. Below is a short

description of a normal menstrual cycle and it is, of course, subject to variation. A diagram is presented that may clarify this phenomenon. The plan is diagrammatic but gives the essentials of the cycle. This description and the diagram were suggested by the recent work of Hartman.[2]

A woman whose periods are regular and normal starts to flow on the first day of the month. During the flow the upper layer of the endometrium is cast off and with it a considerable amount of blood from engorged capillaries in the stroma. After the period is over on the fifth day after the onset the endometrium begins to regenerate and the so-called resting stage is brought about. Soon a gräffian follicle commences to enlarge and becomes ready to allow the escape of the ovum. During this time there is a slight swelling and congestion of the endometrium. On the fourteenth day, with the mild congestion of the resting stage at its height, ovulation takes place and the corpus luteum

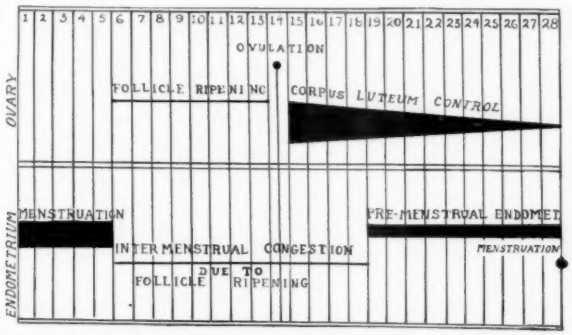

Fig. 1.—Chart showing diagrammatically a normal menstrual period. It is divided into twenty-eight days with menstruation starting and lasting five days and this commencing again on the twenty-eighth day. The interval of intermenstrual congestion due to follicle ripening is shown. The period of corpus luteum control is shown diminishing until menstruation takes place.

is formed. The endometrium during the presence of the corpus luteum becomes thickened and swollen and congested again until on the twenty-eighth day of the cycle, when the corpus luteum has retrogressed sufficiently, the premenstrual endometrium becomes menstruating endometrium.

In a series of cases reported from the Gynecological Section of the Tumor Clinic of the Massachusetts General Hospital,[6] it was found that in 66 cases of uterine bleeding out of 243 no pathologic reason for the bleeding could be found. In 27 of these cases, and they must be the same types that Shaw studied, corpus luteum, gr. xv, and thyroid extract, 1.5 gr., per day were tried with success in 22 cases. Inasmuch as the corpus luteum is absent, even the evidence of a recent one in the Group I cases of Shaw's, is it not possible that corpus luteum therapy has a reasonable basis and that supplying this need in these cases will be of value? In the Tumor Clinic all cases of uterine

bleeding as far as possible are being classified according to Shaw's Groups I, II, etc. As most of these cases are at the age where radium rather than surgery is the proper treatment, difficulty will be found in obtaining material for corroborating his work. However, after the pathologic findings have been checked at operation and in the laboratory, and Shaw's work substantiated, an attempt will be made to select cases with abnormal ovarian pathology and to prescribe the proper gland extract for the patient. This would consist of corpus luteum. That there is reason for the choice of corpus luteum to prevent menstruation or to aid in checking abnormal hemorrhage may be seen from the fact that Crossen[4] states that "undue lengthening of the interval between menstruation in some instances apparently is caused by the formation of corpus luteum cysts. In these cases the corpus luteum does not properly involute and through abnormal extension of its function prevents maturation of another follicle," and that Graves[5] states that "the early theory that the corpus luteum presides over menstruation is no longer tenable, some even holding that menstruation is determined by the elimination of the corpus luteum." It is also true that during pregnancy, when there is no menstruation, the corpus luteum is apparently a very active part of the ovary. In substantiation of the action of the corpus luteum during menstruation the following paragraph from Kaufmann's Pathology[8] giving the opinions of Seitz and Wintz is important: "There are many opinions concerning the condition of the corpus luteum or the relation of the corpus luteum to menstruation. . . . . Seitz and Wintz postulate a very close relationship; stages in the function of the corpus luteum are related to phases in the menstrual cycle; (1) ripening and stretching of the follicles leads to premenstrual changes in the mucosa; (2) the stage of proliferation brings the premenstrual preparations to their full development and leads to the secretory phase in the endometrium; (3) the blossoming of the corpus luteum holds back the secretory phase in the endometrium and through its hormone stops the beginning of menstruation; (4) during the regressive phase of the corpus luteum, the inhibiting influences disappear and menstrual bleeding takes place. According to this, the corpus luteum therefore hinders menstruation. In pregnancy, the corpus luteum is at first persistent; there is, therefore, no menstruation."

In Group I the bleeding seems to be due to both an ovarin and endometrial disturbance. Shaw believes that the thickened polypoid endometrium may exert control over the ovary. It is probably more likely that the abnormal ovary has lost control of its own and of the endometrial cycle. The ovaries are atrophied and a follicle cyst is present. Ovulation has probably not taken place and so the proper physiologic processes are retarded. The corpus luteum and presumably its function are absent from the ovary. During the presence of the active

corpus luteum, premenstrual changes take place in the endometrium and menstruation does not take place until the activity of the corpus luteum is much lessened. Perhaps the abnormal follicle is unable to hold back or control the changing endometrium so that when premenstrual endometrium has fully developed menstruation is inevitable, and will be prolonged until a proper ovarian cycle can be reinstituted.

Below are given the reports of two cases of abnormal uterine bleeding that fall into Shaw's Group I. In one case a follicle cyst of an ovary was present, measuring about one inch in diameter. The remainder of the ovary was corrugated and atrophied and the other ovary was very small and atrophied. Unfortunately the cyst was ruptured inadvertently. Fig. 2, however, shows some corrugation and

Fig. 2.—Photograph of Case P. C. No. 1447 Shaw's Group I. Showing the hypertrophied endometrium. The corrugated atrophic part of the ovary is conspicuous. The lower part of the ovary in the photograph is part of the cyst wall that had been inadvertently ruptured. The uterus is slightly larger than normal. The endometrial cavity has been curetted.

atrophy of the ovary and the darkness and thickness of the endometrium is evident in spite of preliminary curettage. No recent corpora lutea could be demonstrated in the removed ovary microscopically or in the left-in ovary macroscopically. It was not considered advisable to remove the other ovary and so proof of its lack of corpus luteum cannot be given.

CASE 1.—This patient, aged thirty-six years, single, was seen on June 22, 1929, because of uterine bleeding. Her periods had always been regular, every twenty-eight days, until December, 1928, when her period was slightly less than normal. The January period was skipped and no menstruation occurred again until June 1, 1929. Since that time she has been flowing steadily. The June period began normally but did not cease and she used about two napkins a day. Her blood studies were negative except that the platelets were large and greatly increased

in number. Because of the history a diagnosis of Shaw's Group I was made before operation. Examination under ether and subsequent operation showed a slightly enlarged uterus with no demonstrable adnexal pathology. There was a clear follicular cyst of the right ovary about one inch in diameter. The rest of the ovarian tissue, including the other ovary, was atrophied and wrinkled. The uterus and right ovary were removed. The left ovary was left in place. Following is a copy of the pathologic report: (1) Uterus measuring 8 cm. x 6 cm. with cavity 6 cm., amputated by coning out the cervix. The endometrium is hypertrophied and markedly injected. The uterine cavity contains blood and necrotic matter. The myometrium is negative. (2) The left tube is attached to uterus and normal. (3) The right ovary is atrophic, pale yellow in color and contains 2 small, clear cysts and 1 large thin-walled cyst, containing clear, colorless fluid. Microscopic diagnosis: hypertrophy of endometrium. Follicle cyst of ovary. Tube negative.

In the other case the patient flowed excessively following two separate periods of amenorrhea. Both her ovaries were removed along with the uterus and in neither ovary could any sign of a recent or old corpora lutea be found.

CASE 2.—This patient, aged forty-two years, married, with three children. She had been perfectly well up until four months previous to her visit to the hospital when, following a normal period, she flowed continuously for eighteen days. She then skipped two months and flowed again for twenty-two days. Her periods had always been from twenty to thirty days apart and small in amount. Ether examination showed a lacerated cervix, which was repaired. The uterus was large and a great deal of thick, red endometrium was removed. Abdominal operation then disclosed a fairly good-sized uterus without fibroids, a very small and atrophied right ovary and a left ovary about 3 cm. in diameter containing a cyst full of clear fluid. The rest of the ovary was rough and apparently atrophied. The pathologist sectioned both ovaries very carefully for signs of fresh or recent corpora lutea. He reported that it was impossible to find any sign of a corpus luteum in the ovarian tissue. Following is a copy of the pathologic report: "Specimen consists of a uterus amputated at level of internal os, both tubes and ovaries. Uterus 7 cm. from fundus to internal os. Endometrium slightly injected, surface granulated. Right ovary contains one simple cyst 1 x 1 cm. full of clear yellow fluid. Left ovary contains one simple cyst 2 x 2.5 cm. full of clear, yellow fluid. No corpora lutea found in either ovary. Microscopic diagnosis: myometrium negative. Simple cysts of ovaries."

In Group II ovulation is too frequent and therefore menstruation is too frequent. Too many corpora lutea are present and apparently ineffective as they are unable to prevent the greatly increased incidence of ovulation, which is a function of the normal corpus luteum (Loeb[5]). These corpora lutea are normal macroscopically and microscopically but have not retrogressed normally and this lack of retrogression plus the ineffective prevention of ovulation makes for the assumption that the corpora lutea are not physiologically normal. It is within reason to assume that extract of the corpus luteum might exert some influence upon the ovarian cycle if supplied in sufficient amount. This will be tried in cases in the Tumor Clinic as soon as enough pathologic material is at hand to substantiate Shaw. In a patient recently operated upon a preliminary diagnosis of Shaw's

Group II was made and the pathologic organs predicted. It was expected that an enlarged uterus, quite symmetrical would be found and definite atrophy of the ovaries with too many corpora lutea. At operation the demonstration of the lesion was quite dramatic for the exact pathology had been predicted. In this case also it was not considered advisable to remove both ovaries on account of the youth of the patient, but the uterus and the left tube and ovary were removed. The endometrium was slightly thickened and pink in color. It could be easily called watery looking. The left ovary contained a fresh corpus luteum and scattered throughout these atrophied, small, rough ovaries, stigmas of recent ovulations could be found. The pathologic report showed that too many corpora lutea were present. A photograph

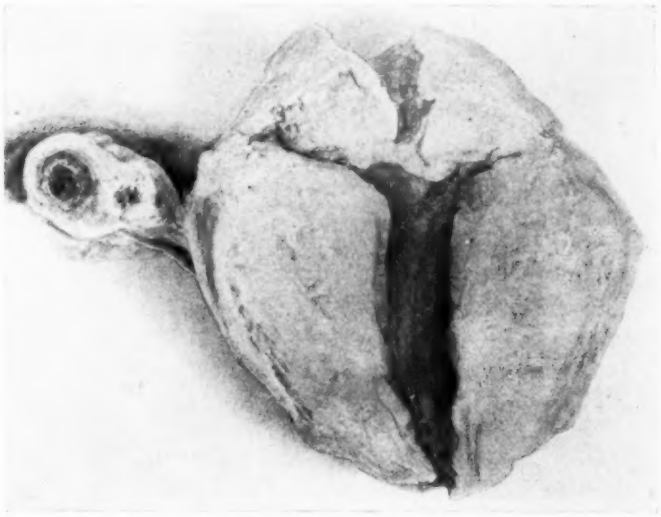

Fig. 3.—Photograph of the uterus and ovary, Case 3, Shaw's Group II. This shows the symmetrical enlargement of the uterus and the somewhat thickened endometrium. The ovary shows on its lateral surface a fresh corpus luteum bulging through the cortex. Some of the atrophic corrugated ovarian tissue can be seen medially.

showing the type of uterus and ovary found in this case is presented, also a drawing of the longitudinal cut section of the removed ovary showing three recent corpora lutea and one very new one close to the surface of the ovary. Below is the history and pathologic report of this case:

Case 3.—Aged thirty-two years. For the past one and a half years this patient had severe uterine bleeding. She menstruated every two weeks, the period lasting six or seven days, and she used five napkins per day. She was quite thin and looked badly from loss of blood. Her periods previous to one and a half years ago were perfectly normal. She has had two children, both living and well. From the history of the case and physical examination she was placed in Shaw's Group II. A supravaginal hysterectomy was done, removing the left tube and ovary. The pathologic report follows showing the enlargement of the uterus and the report

of the definitely increased number of corpora lutea: "Specimen consists of a hemisection of uterus. The endometrial surface is pinkish-red. The wall is 3 cm. thick at fundus, 1 cm. at internal os. The left tube and ovary are attached. The ovary contains a small cyst on surface with otherwise normal corrugations. Cut section shows 3 cysts with bright yellow walls 1 mm. thick, the largest 1 cm. in diameter and full of jellied, reddish colloid material. One small hemorrhagic cyst is also present. Microscopic diagnosis: chronic endometritis. Increased number of corpora lutea."

In discussing a recent paper by Fluhmann[3] on the "Endometrium in so-called Idiopathic Uterine Hemorrhage," Ludway A. Emge's remarks throw some light upon Shaw's Groups I and II. He says: "If we exclude the inflammatory pathologic changes, we are left with an endometrial disturbance which singly expresses the end phase of a still unexplained functional disturbance. We may suspect its immediate origin to be a disturbance of the thyropituitary-ovarian interchange. The immediate effect is the resulting disturbance of the follicular apparatus of the ovary, which may manifest itself in the production of

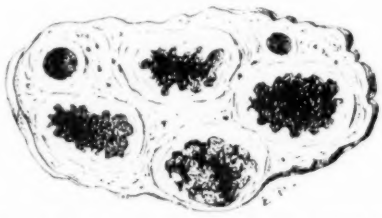

Fig. 4.—Cross-section drawing of ovary. The fresh and the three recent corpora lutea are clearly shown, demonstrating the fact that ovulation was too frequent in this patient who flowed every fourteen days.

one or more persisting follicles possessed of a prolonged stimulating action on the endometrial cycle, or in the faulty corpus luteum behavior, or both. The vascular manifestation, that is bleeding, is therefore only the end-result. Hyperplasia of the endometrium, as Dr. Fluhmann has pointed out, is not a constant factor and may constitute only a phase in the entire process, for we know that many hyperplasia found accidentally show no signs of bleeding."

In Group III it was evident to Shaw from the study of a few cases that the ovaries were grossly pathologic, they were large, intensely hyperemic and contained many follicular hematomas. No patient placed in this group before operation has been operated upon in the Tumor Clinic, but one case seen is probably of this type. The menstrual cycle of this patient is from three to six weeks apart with a large flow, and cases with this history are included by Shaw in his Group III. A case report follows:

CASE 4.—This patient, aged forty-five years, single, entered the hospital Dec. 31, 1928. She flowed in July, 1927, and then skipped until September, 1927, when she flowed two weeks and then skipped again until December, 1927. Her uterus was

hard, large, but in good position. Curettage done in January, 1928, showed nothing abnormal. She was again seen in August, 1929, as she had been flowing irregularly since operation every three to six weeks and having very large periods. She was curetted again in September, 1929, and normal endometrium found. At the present time she is having deep x-ray therapy in the hope that her periods can be stopped. This patient quite definitely falls into Shaw's Group III along with the patients who flow a great deal in irregular intervals of three to six weeks.

In Group IV the ovaries are definitely pathologic, being large, hyperemic and hyperplastic, the endometrium is intensely red and congested and there is enormous hyperemia. The corpus luteum is definitely abnormal, being large and cystic. Shaw states that the bleeding in this group is probably due to the congestion of the endometrium and that it is unrelated to menstruation. This congestion is that present at the time of follicle ripening and not the premenstrual congestion. Two cases of this type have been encountered. One patient's regular flow was very severe and corpus luteum and thyroid extract feeding have helped her a great deal. The other patient flowed between her periods for three to four months. Corpus luteum and thyroid extract have also helped her. Ten days after taking the medication the flowing ceased and her periods were straightened out completely for eight months. Later the same symptoms recurred and she is now taking corpus luteum again.

The above treatment was entirely empirical and was given because of the success in treating irregular uterine bleeding cases with it. This must be a rare group, but perhaps it is difficult to recognize. Two case reports of patients in Group IV follow:

CASE 5.—This patient, aged twenty-one years, without children, has had very severe bleeding. She is very thin and anemic. Her periods have always been either slightly early or slightly late. Her last period was one week early and accompanied by considerable pain. In taking her history she volunteered the information that she has had a pinkish to bloody discharge between her periods. Her period in August, 1929, lasted sixteen days and came a week early. Her September period was three days late and very severe. Blood studies were negative and her basal metabolic rate −3. Examination showed a large uterus in good position. Both ovaries could easily be felt through the thin abdominal wall and they were of normal size and no cysts could be made out. She was given thyroid extract and corpus luteum and was seen again in October, 1929, when she looked and felt considerably better. Her period had lasted only three or four days and she stated that this was the best period she had had in a long time. She will continue with corpus luteum and thyroid extract through her next period. The intermenstrual discharge of pinkish to bloody material is characteristic of Shaw's Group IV.

CASE 6.—Aged twenty-one years, single. This patient gives a history of flowing between her periods for three to four months with occasional nausea and pain. Up to this time her periods were usually regular and normal in amount. She is very thin and resembles in some ways the previous patient. Examination showed a very large cecum full of fecal matter. Pelvic examination was not done because of an intact hymen. Rectal examination showed a small, freely movable uterus. She was given 15 grains of corpus luteum and 2 grains of thyroid per day and at the end of ten days her period stopped and for the next seven months her periods

were perfectly normal and regular. She took the corpus luteum and thyroid for about one month. She was seen again after the recurrence of her irregular bleeding seven months later. She had flowed for about ten days between periods and had repeated by flowing a week following the cessation of the next period. She had some nausea and abdominal pain. Examination showed the same findings except for a question of an enlarged right ovary. She was given corpus luteum without thyroid this time.

Of Group V, the additional group of patients with endometritis, there can be no question. Numerous instances of this type have been encountered in hospital and private practice, most especially in the acute stages, either of puerperal or gonorrheal infection. No case reports of this type of bleeding are included in this paper.

The cases described and investigated by Shaw are known under many different names, such as subinvolution of the uterus, fibrosis of the uterus, uterine insufficiency, arteriosclerotic uteri, etc. The so-called bleedings due to menopause changes are also included in the groups. Bleeding attributed to hyperplasia or hypertrophy of the endometrium is in many instances of this type.[7] His report, therefore, has wide significance for a reasonable explanation is offered to explain the abnormal bleeding of many patients.

It is quite evident from attempting to classify cases seen in the Tumor Clinic that cases seen previously cannot be reclassified because of the inadequate histories.

All cases cannot be grouped and with more and more experience in attempting to do so the problem becomes even more difficult. Perhaps with more study of the histories and pathologic findings it may become easier but already cases have been seen and studied from all angles that cannot be placed definitely in any one group. However, Shaw has presented a structure to build upon and some cases definitely fall into his classification as seen in this clinic. It is therefore felt that more work must be done upon this problem as he sees it. Cases of thrombopenic purpura and of atypical purpura that occasionally are met with cannot be grouped into this classification and they may account for some of his unexplained 17 per cent.

It must not be forgotten in the enthusiasm to group, understand and perhaps treat medically these cases, that most of them are in the cancer age and that above all they must of necessity be examined under ether and curetted and the tissue microscopically examined. Gland treatment may be tried in a few cases but the great majority will eventually fall into the hands of the surgeon and radiologist.

SUMMARY

1. This paper was written with the hope that a summary of Shaw's work and case reports of the types of cases he has described would familiarize the medical profession with his research. His paper is very much worth reading and studying.

2. Cases of irregular uterine hemorrhage have been divided into groups in which the histories, physical findings, and pathologic material are similar.

3. Suggestions as to the cause of bleeding are given by Shaw.

4. It is quite possible that corpus luteum therapy may have a reasonable basis.

5. Three cases are presented with histories and pathologic findings identical with those described by Shaw. Three other cases with histories similar to those found in his Group III and Group IV are presented.

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Neverman, H.: The Fate of the Eclamptic Patient. Arch. f. Gynäk. **129:** 891, 1927.

The author was able to trace 60 of the 291 eclamptic patients who were treated at the Hamburg clinic. Of these, 27 had no complaints and were apparently well; 13 complained of persisting headaches; 12 of weakness of memory; 4 of visual disturbances; 5 of edema of the legs; 3 had no complaints, but upon examination, likewise showed findings which could be attributed to damage to the central nervous system by the eclampsia. Eight had a definite hypertension and three had albumin and casts in the urine. These latter were unquestionably cases of recurrent nephritis. No patient was found to be suffering from chronic nephritis. The renal changes which persist after the eclamptic patient has recovered are probably nephritic in type and involve the tubules. Definite changes must take place in the blood vessels and in the vasomotor system to produce the persistent hypertension.

Following their attack of eclampsia, eight patients had had one normal pregnancy, one had had two pregnancies, and one had gone through five pregnancies. Four of these women showed edema during their pregnancies and in four there was a second eclampsia present. In one of the latter, eclampsia had recurred in two successive subsequent pregnancies. Eclampsia is, therefore, prone to recur and a former eclamptic patient must be carefully watched in subsequent pregnancies.

Ralph A. Reis.

TUBAL STRICTURES AND THEIR LOCALIZATION BY MEANS OF UTEROTUBAL INSUFFLATION AND THE KYMOGRAPH*

WITH NOTES ON THE COMPARATIVE VALUE OF LIPIODOL†

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UTEROTUBAL insufflation was originally planned as a nonsurgical method of determining the patency of the fallopian tubes and was presented in April, 1920, before the section of Obstetrics and Gynecology of the American Medical Association.[1] It was offered as an improvement over the intrauterine injection of collargol and the x-rays, a method with which Cary[2] and I had independently acquired some experience six years before.[3, 4]

The replacement of collargol was prompted by the fact that collargol caused inspissations in patent tubes which might produce occlusion. There were also unpleasant pelvic peritoneal reactions which followed the introduction of collargol into the peritoneal cavity. These two disadvantages which were observed in a few cases weighed against its general adoption as a specific diagnostic procedure.

To obviate the inspissations I tried to substitute clear solutions for collargol, using first thorium and then sodium bromide. The peritoneal reaction from these solutions was also unpleasant if not as severe as when collargol was used. This led me to seek a substance which could be used to determine patency of the tubes and which at the same time would leave neither residue in normal tubes nor cause peritoneal irritation.

Oxygen appeared to meet these demands and was the first gas to be employed for that purpose. Soon after Stein and Stewart[5] had demonstrated the production of pneumoperitoneum by injecting oxygen through the anterior abdominal wall, I conceived the idea of introducing this gas through the uterus. Its specific object however was to demonstrate tubal patency. The resulting pneumoperitoneum "was conclusive in proving the patency of the genital canal from the external end to the internal abdominal end. This, however, could result only when one tube was patent and the other closed, as well as when both tubes were patent." To quote further from the same paper, "For practical purposes in the consideration of sterility it suffices that one fallopian tube is patent. Future observations may make it possible for us to draw definite conclusions on the question of unilateral or bilateral patency, and, if unilateral which side is open or closed."[1]

*Read at a meeting of the Brooklyn Gynecological Society, February 7, 1930.

†The material on which this study is based is derived from the sterility clinic of the Gynecological service at Mt. Sinai Hospital, and from private practice.

Failure to produce a pneumoperitoneum must necessarily indicate a blockade in both tubes. Since it was thus possible to demonstrate patency as well as nonpatency I abandoned for the time being earlier attempts made six and five years before with solutions opaque to x-ray. In view of the wider adoption of such solutions in more recent years, it is of some interest perhaps to quote from the same paper. "In the nonpatent cases one may also use thorium or bromid as a control. The citrate thorium solution or sodium bromid solution may be injected into the uterus, and under obturation the roentgenogram may be made. I did this a few times in the earlier experiments but have been able to dispense with it in my later work."[1]

Increasing experience with uterotubal insufflation enabled us to note that the gas before it passed through the tubes into the peritoneal cavity was subjected to different degrees of pressure. The significance of the varying pressures was better appreciated as time went on. Carbon dioxide gas was substituted for oxygen as it was very much more quickly resorbed and because it minimized the resulting shoulder pains.

Since the adoption of a kymograph in 1925 to note the reactions of the fallopian tubes to the insufflated gas, many new facts have been brought to light that could not have been ascertained before. Through numerous experiments upon animal tubes and upon human uteri and tubes it became possible to answer the question of first importance, namely, *what is normal patency?* It soon developed that normal tubes exhibit peristaltic motions which vary with the phase of the menstrual, i.e., ovarian cycle. From three to four peristaltic movements per minute in the interval stage to several more impulses in the ovulation or midintermenstrual phase were noted in experiments with strips of tubes.

When tested clinically these peristaltic motions are demonstrable upon the kymograph. In normal cases patients do not feel the slightest pain reactions referable to the tubes themselves. At most they complain of a sense of discomfort in the suprasymphyseal area referable to the uterus which is momentarily distended. The slight discomfort lasts for the brief period before the gas passes through the uterotubal junction (the first physiologic barrier) and diminishes as the gas passes through the fallopian tubes into the peritoneal cavity. Frequently the patients state they have an "unwell feeling" quite similar to the menstrual molimina. In many cases even this slight discomfort is absent.

In the presence of some stenosis or stricture of the tube on the one or other side, there is as a rule some pain referable to the tube affected if unilateral and to both if the stenosis is bilateral.

Attention was called to this phenomenon in a volume on *Symptoms in Gynecology*, published in 1923, before the kymograph was available.[6]

With the aid of the kymograph we may diagnosticate various degrees and types of tubal abnormality. The use of lipiodol, iodipine, etc., has further enabled us to check up the interpretations of the findings with uterotubal insufflation in the nonpatent cases and in those with a high grade stenosis. The superiority of these iodized oils over collargol and iodine or bromide in solution was realized soon after Siccard and Forestier's publication in 1923.[7] Lipiodol was employed by us for fluoroscopic visualization of the tubes in an attempt to study their physiology and for purposes of comparison with the findings obtained by the gas method.[8]

A comparative study of lipiodol and CO_2 uterotubal insufflation in 66 cases of tubal obstruction was made by me and presented by proxy at New Orleans, December, 1927.[9]

Though a résumé of that paper should prove of considerable importance in connection with the present topic it will suffice at this time to give the concluding paragraphs: "CO_2 uterotubal insufflation has proved to be superior to lipiodol in demonstrating (a) uterotubal spasm, which can be graphically recorded by the kymograph; (b) in demonstrating the presence and type of tubal peristalsis *with uniformity* in patent tubes; and (c) in revealing the presence of tubal adhesions which do not completely constrict the tube lumen. The salpingograph can reveal the first point of occlusion of the tube lumen but not the presence of tubal adhesions which may bind the tube externally without obliterating the canal. Tubal peristalsis which is altered under these conditions can be demonstrated by the kymograph. Occasionally in the hands of an expert the diagnosis of tubal adhesions will be ventured. My associate in this x-ray work, A. J. Bendick, has reported the finding of tubal adhesions on two or three occasions."

It is of interest in this connection to quote from H. Sellheim who has had a large experience with uterotubal insufflation. Sellheim states that "roentgenography of the fallopian tubes has not shown us more than insufflation as far as patency or nonpatency is concerned. Roentgenography is however the only means, at least, by which in many cases we may obtain some idea of the site of the obstruction so that before doing a laparotomy we may know whether we may have to do a salpingostomy or tubal implantation depending upon whether the obstruction is at the fimbria or at the isthmus."[10] I have been particularly interested in seeing whether it was not also possible to determine this point by uterotubal insufflation. Based on increasing experience with uterotubal insufflation I have been able to call attention to the diagnosis of the site of tubal obstruction; i.e., at the uterine end and at the fimbria, without resorting to the use of intrauterine iodized oil injection.[11, 12]

The present paper is concerned with further studies in the localization of strictures in the fallopian tubes by means of uterotubal insuf-

flation and the kymograph. Additional notes on the comparative value of both methods have been included in this study.

The technic of uterotubal insufflation has improved from a somewhat crude first effort to its present development. The apparatus employed to test tubal patency now includes a kymograph in addition to the quantimeter and manometer. The fluoroscope is still a useful adjunct which I have resorted to constantly for accurate control. The kymograph however has practically enabled me to dispense with the fluoroscope in normal patency. Thanks to these aids the interpretation of the findings has led to more refined diagnosis. Thus not only is an answer available to the question whether in a certain case the fallopian tubes are open or closed, but also if patent, to what degree they are open. For it must obviously make a difference whether a pressure of 40 or 60 mm. Hg or one of 200 mm. Hg or more is necessary to open the tubes. Thus data of prognostic value in a given case of sterility are added to the diagnostic value.

There were 650 cases of sterility examined with the kymograph up to May, 1927.[12] Four hundred sixty-five cases or 71.5 per cent proved to have tubal patency of all degrees. There were 185 cases or 28.5 per cent which proved to have nonpatent tubes.

Of the 465 cases with tubal patency, 275 could be considered normally patent. In 78 cases patency was somewhat impaired, i.e., pressures were from 90 to 150 mm. Hg. In 24 (4 per cent) there was an element of spasm, hypertonicity, i.e., the pressures ranged between 150 to 200 mm. Hg.

In 52 cases the diagnosis of slight peritubal adhesions was ventured; the pressures ranged between 90 and 150 mm. Hg and no manometric fluctuations were recorded on the kymograph.

In 36 cases (5.5 per cent) there was evidence of high grade stricture, the pressures ranging between 150 and 200 mm. Hg and no manometric fluctuations were recorded on the kymograph. In all these cases a subphrenic pneumoperitoneum proved patency.

In the majority of instances where patency at high pressures was observed, i.e., cases of high grade tubal stricture, the insufflation was repeated no more than two times. In a few cases it was repeated three or more times when the patient wished to avoid operative intervention and hoped for some therapeutic result from the insufflation. The occasional successful case encountered under these circumstances encourages one to persist when, other factors being equal, there is nothing left to help these patients with tubal strictures. The extrinsic strictures are more apt to yield than the intrinsic.

The kymographic record of nonpatency is characteristic and never varies. There is a gradual steep ascent to 200, the highest point experience has taught to be safe. At this point the gas valve is shut. The tracing then becomes horizontal and falls sharply when the release valve is opened or when the cannula is removed from the uterus.

In normal patency the pressure rises to any point well below 100, drops sharply 10 to 30 mm. Hg and rises that many mm. or more or less, falling again successively three to four times per minute as a rule in the postmenstrual phase when the method is most properly used. The initial pressure rise depends upon three factors: (1) the rate of speed of the gas flow; (2) the muscular resistance or tonicity of uterine wall; and (3) the uterotubal sphincter. As the rate of flow can be a constant factor (say in the ratio of thirty seconds for each siphon pulsation of the automatic volumeter employed in the apparatus) the uterine wall tonicity and sphincter tone can be readily determined in terms of mm. Hg.*

When a permeable stricture is present the initial pressure rises as a rule to more than 100 mm. Hg and instead of dropping sharply and exhibiting oscillations the kymographic tracing shows definite deviations. The descent of the curve from the initial drop is more gradual. It may exhibit slight oscillations at first or none at all; or it may upon reaching a much lower level, maintain a more or less horizontal line or even exhibit slight fluctuations resembling those encountered in normally patent tubes. Frequently the drop of the pressure is so gradual as to describe a parabolic curve. In such cases oscillations are less likely to occur.

In the presence of spasm the initial rise of pressure is high, up to 150 mm. Hg or more when a sudden drop is noted varying between 50 and 100 or sometimes more mm. Hg in depth, after which normally appearing oscillations come into evidence.

A combination of spasm with stricture can occur but this is not very frequent. As a rule the strictured tubes will produce kymographic tracings during uterotubal insufflation that are characteristic.

The depth of the subphrenic pneumoperitoneum, other things being equal, is a practical guide as to the type patency, i.e., the degree of stenosis present. If, for example, 120 c.c. of gas will produce *an immediate* subphrenic pneumoperitoneum represented by a meniscus under the diaphragm of one to one and one-half inches in a woman five feet, four inches, weighing one hundred thirty pounds, the same amount of gas in a person of equal height and weight whose tubes are strictured will produce a meniscus of approximately one-fourth to one-half inch in depth. The gas bubbles forced at the high pressure through a small aperture are necessarily smaller on the one hand, while on the other a good deal of the gas will be regurgitated back from the cervix and hence will not reach the peritoneal cavity. In a few instances part or whole of the gas volume is caught by adhesions

*What particular importance the variation in uterine tone can have with respect to fertility and gestation cannot yet be stated. From personal experience there are indications that uterine tonicity is influenced in part at least by hormonal activity of the ovaries. But this will be developed at length in a future paper.

in the pelvis surrounding the tubes and ovaries and thus fails to rise to the diaphragm altogether. Some of the gas may reach the subphrenic space after a delay of several or more minutes.

By observing the pain reactions to the insufflation we can determine whether the site of obstruction is on the one side or other, or both. The patient often does not stress her sensory experiences. It is therefore necessary always to ask her to describe them carefully with reference to location and distribution.

In this respect we may recall the character and distribution of intestinal distention, the location of the colic and pain radiation. We may also recall the pain produced by enemas and the relief that fol-

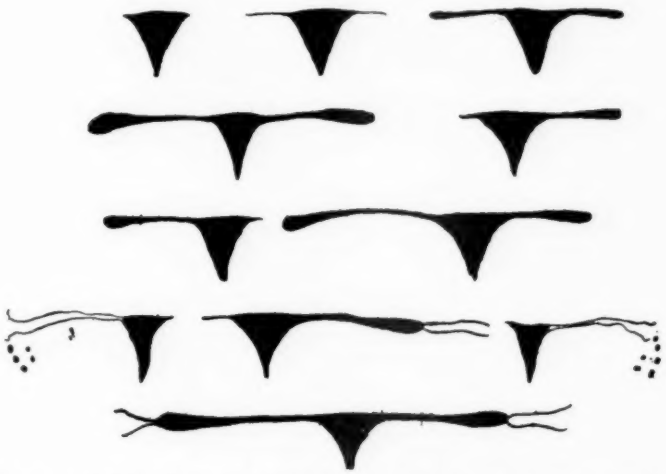

Fig. 1.—Types of tubal closure and stricture; bilateral, unilateral, symmetrical, and asymmetrical.

lows the evacuation of the colon. An exquisite analogy can be drawn from the injection of solutions into a ureter in order to determine its capacity. The pain due to ureter and kidney pelvis distention is prompt and characteristic and disappears as soon as pressure is released. The pain characteristic of tubal pregnancy is too well known to require description here.

It has been noted that when the obstruction is bilateral, the pelvic pain is bilateral during uterotubal insufflation. When it is unilateral the pain is unilateral. There are few exceptions to this rule.

In general, the points of obstruction are at the uterotubal junction, in the isthmus, at the isthmicoampullary junction, at some point of the ampulla, or at the fimbria. The stricture may be bilateral and symmetrical or asymmetrical or altogether unilateral. One tube may be freely patent while the other may be absent through operative ablation, or congenital failure, or the tube may have a stricture at one of the points mentioned above. (Fig. 1.)

In approximately the last 60 cases of tubal obstruction previously determined by uterotubal insufflation which I have checked up by lipiodol injection the diagnosis of the site of obstruction was made before the lipiodol was injected. In order to compare the findings with each method I have drawn shadowgraphs showing the points of obstruction as found by uterotubal insufflation. They were then compared to the skiagraphic shadows obtained with lipiodol.

Localization of the different sites of stenosis or obstruction by means of uterotubal insufflation.

The data with regard to strictures are based for the most part on observations made upon patients coming for the relief of sterility as follows:

1. Those who have had one fallopian tube removed for some reason or other and the operative note is so recorded.

2. Those where a conservative operation was done upon one or both tubes, the facts being known concerning the nature of the procedure and the point of resection.

3. Patients operated upon after CO_2 uterotubal insufflation have demonstrated a stricture and later controlled by another or several insufflations. The findings at the operation can check the interpretation made preoperatively.

4. Cases in which the tubes have been ligated and the test is carried out to make certain of impermeability. In a few cases I have purposely applied the ligature at uneven portions of the tubes in order that I might note the pain reactions on both sides when the test for patency is done at some time after the operation.

5. Cases in which without previously being insufflated, the tubes and ovaries were freed from adhesions in the course of some other pelvic operation.

6. By controlling the insufflation findings with lipiodol injections.

7. Finally, by experimental duplication of adhesions and strictures on surviving extirpated uteri and tubes.*

IMPERMEABLE STRICTURES

I. Bilateral and symmetrically located obstructions.

A. Total obstruction at uterotubal junctions.

(1) The pressure reached is 200 or more; there is no drop after the gas valve is shut. The curve runs horizontally and drops sharply vertically as soon as the cannula is removed or the release valve is opened. The CO_2 cannot be demonstrated by fluoroscopic examination. There are no shoulder pains.

(2) Distention pain is complained of and is referred to the midline, in the suprasymphyseal area. There is no lateral radiation of the pain. The insufflation may be repeated once or twice at the same sitting, not only to corroborate the first finding of pressure and pain reactions but also to eliminate the element of spasm which may be present.

*These will be published separately in the near future.

B. Total obstruction at the isthmus.
   (1) Same as (1) in A.
   (2) Pain is somewhat lateral, the midline pain also being present and prominent. The nearer the ampulla to the site of obstruction the more constant is the presence of lateral pain.

C. Total obstruction at ampulla.
   (1) Same as (1) in A.
   (2) Pain radiates well out to sides. The nearer the fimbria to the site of obstruction the more marked is the pain.

D. Total obstruction at the fimbria.
   (1) and (2) practically as in C. Pain may radiate to lumbar region and sometimes down one thigh or the other.

When the site of obstruction is asymmetrical the pain reactions generally hold true according to the above.

The amount of distention with gas is obviously not as demonstrable radiographically[13] as when lipiodol is used but the character of the pain and its distribution often enable us to estimate that point. Occasionally I have palpated a somewhat distended but flaccid tube immediately after the insufflation.

When total, i.e., bilateral tubal obstruction of the tubes is present, there is practically no difference in the interpretation of the findings whether insufflation or lipiodol is employed.

PERMEABLE STRICTURES

In the permeable strictures a good deal depends upon the amount of pressure employed with either method. As has been shown[11] when greater pressure is used with lipiodol one can succeed in forcing the oil into the peritoneal cavity and the same holds true for gas. In repeating insufflation either at the same examination or subsequently one succeeds not infrequently in forcing the gas through a tight stricture by raising the pressure 10 to 20 or 30 mm. Hg. The amount of pressure required when lipiodol is injected in similar cases is considerably greater.

The striking departure between both methods is seen in instances of permeable strictures. If lipiodol is injected without manometric control and the oil globules are seen upon the x-ray film as having entered the peritoneal cavity it demonstrates nothing more than by the crude method of transuterine tubal inflation as first done by myself and others. The manometer after all does add to our knowledge of the tightness of the stricture or the adequacy of the tube lumen. If the injection of lipiodol or iodized oil is not controlled fluoroscopically and the plate is not made immediately with the uterine cannula in situ, one cannot say which tube is open and which may be closed. Nor can permeable strictures be determined by means of lipiodol unless constant fluoroscopic examination is made and supported by x-ray films taken at stated intervals afterward.

A very striking proof of the patency of the tube is the fluoroscopic visualization of *the spurt of the oil through the fimbriated end* in a manner similar to the escape of urine into the bladder from a ureteral orifice. This is occasionally observed and under such circumstances the tube may be definitely considered patent. The question of stricture is however not so readily settled. The localization of permeable stricture can, if great care be exercised, be demonstrated by lipiodol injection under most painstaking fluoroscopic and manometric control. It must be remembered however that the oil after passing through the stricture reaches the abdominal cavity and must finally be taken care of by the peritoneum. In actual experience not a small proportion of patients complained of abdominal cramps for twelve to twenty-four or more hours following lipiodol injection, an experience which is extremely rare when carbon dioxide gas is used. The offensive odor of the vaginal discharge which may last for twenty-four or forty-eight hours is also a disadvantage.

Comparable to the spurt of oil which one can see by carefully watching with the fluoroscope, is the characteristic sound heard with the stethoscope as the CO_2 escapes from the fimbriated end into the general abdominal cavity. (Henderson and Amos.[14]) This is constantly to be heard in the patent cases. Abdominal auscultation is considerably easier to carry out and can be done by the examiner. The heavy weighted stethoscope devised by M. Leff is very serviceable. When as occasionally happens, the gas is caught by pelvic adhesions it becomes fairly rapidly absorbed and leaves no trace in a few hours. The same cannot be said of lipiodol. When pelvic adhesions are not present and do not catch the gas the latter rises at once to the subphrenic space where it is rapidly resorbed.

Here it may be well to point out that the side upon which the subphrenic pneumoperitoneum appears is not diagnostic of patency of the tube situated on the corresponding side; because a right tube may be patent with the gas appearing under the left diaphragm and a left tube may be patent with the gas appearing under the right diaphragm; or both tubes may be patent and the gas appear only on one side or the other. Frequently the gas will be seen under both halves of the diaphragm. When the meniscus is seen under the left diaphragm I have been in the habit of putting the patient upon her left side while making pressure over her right chest. This forces the gas to rise to the right side and may readily be seen as a right-sided subphrenic pneumoperitoneum. Unless one is experienced in differentiating the gas bubble almost constantly present in the stomach one may mistake it for a left-sided subphrenic pneumoperitoneum. It is best therefore when in doubt to resort to that change in posture because gas under the right half of the diaphragm cannot be mistaken for anything else.

Another type of tubal abnormality which cannot be so readily diagnosticated by lipiodol injection is presented by peritubal adhesions. These do not necessarily act as a barrier to lipiodol or gas under pressure but the physiologic condition of the tubes is so altered as to have an important bearing upon the question of fertility or sterility. Thus the pressure required may be 100 or a little higher or lower but the tube is bound down by adhesions that prevent it from exhibiting normal peristalsis. The two types of motility which normal tubes exhibit under purely physiologic conditions are the typical vermicular motion and the lateral swaying or writhing movement.[8] These tubal movements have been observed with the fluoroscope in the living subject and in experiments with freshly extirpated and surviving specimens of uteri and tubes.[15]

Tubal peristalsis can of course be demonstrated by repeated x-ray plates (several per minute) to "catch" the tube in the peristaltic motion. It requires an extremely well-trained and patient roentgenologist. Moving x-ray films would be of decided help in this respect. There can be no doubt that this will be accomplished in the future. Its scientific value is unquestioned. Practically and economically it is another matter.

A satisfactory idea of the behavior of the tubes during insufflation is at once given by the tracings which are automatically recorded by the kymograph. By comparing the peristaltic waves of normally open unhampered tubes we may get a good idea of what takes place when the tubes are bound down by adhesions. The character of the curves is altered depending upon the density and extent of the adhesions. . . . . The tubes under these conditions are "bridled" as it were and are prevented from exhibiting normal peristaltic motions which begin as a rule at the fimbria and proceed toward the uterus.

The question arises concerning the combination of one normal and one abnormal tube. If one tube is normally patent the gas passes the uterotubal junction of that side below 100 mm. Hg and as it passes through the lumen of the tube it is compressed upon by the waves of peristalsis normally present. These are evidenced upon the kymograph. By auscultating one can get a bruit most pronounced as a rule on the side which is normally patent. *This bruit is intermittent in character in normal tubes*, the silent pauses being synchronous with the rises of pressure which are in turn synchronous with the contraction phase of the peristalsis. With each relaxation the bubbles are propelled through the fimbria producing the gurgling sound on the side from which the gas escapes. If no sound is heard upon the other side it is presumptive evidence that some obstruction exists there. Unfortunately the sound is transmitted from the normal to the abnormal side so commonly as to make this physical sign unreliable for judging patency of both tubes. *If the sound is more continuous how-*

ever on one side it indicates a permeable stricture. The gas escapes from the fimbriated end under continuous pressure which is only mildly affected or not all modified by the very much impaired contractions of the tube. If in addition pain is felt by the patient on the side where this continuous bruit is heard it indicates also a certain degree of distention. The pain will scarcely be felt when the obstruction is complete and is located at the isthmus. Pain is, as a rule, greater when the permeable stricture is situated near the fimbria or ampulla.

This combination of one normal tube and the other strictured but permeable may be ascertained by lipiodol injection only when controlled by careful and constant fluoroscopy and by taking repeated plates. Unless this is done carefully the oil may enter the peritoneal cavity and appear on the film without leaving a clue as to the side in which the normal tube lies. Unless the abnormal tube is tortuous and dilated, the lipiodol can be expelled through the uterus by peristalsis and may not be visible in the plate. If the oil is finally seen in the free peritoneal cavity after several plates have shown the same or practically the same dilatation and tortuosity of the tubes, the diagnosis of permeable stricture is justifiable. (A. J. Bendick.)

In the last analysis the effort involved in elucidating this point is more of academic than of practical interest because it is clear that when one tube is normally patent pregnancy is possible. It is true however that such an individual's chances of becoming pregnant are reduced by half. Bilateral strictures with diminished patency necessarily reduce fertility in direct proportion. The extent to which the presence of a permeable stricture and its location can be determined by uterotubal insufflation is illustrated by two cases just recently examined also by lipiodol injection. A third case of nonpatency is added for contrast. It was examined the same time. Differential points are especially noted.

CASE 1.—(L. G.) First insufflation May 9, 1928 (Fig. 2), showed shallow fluctuations of 5 mm. Hg in depth. Initial drop at 75; drop not sharp. Second insufflation January 30, 1930 (Fig. 3). Pressure rose to 210 first attempt, describing a horizontal line at that level. Second attempt: initial rise to 135 mm. Hg, began describing a parabolic curve at 100 mm. Hg; practically no fluctuations. Points (*X*) (see Fig. 3) indicate pulsations of siphonometer. Pain was complained of on both sides. On abdominal auscultation gurgling was heard at 100 mm. Hg on the right side and continued as long as the gas passed through. There was very faint regurgitation from the cervix and gurgling was audible on the left side of the abdomen as well.

Diagnosis.—Stricture of right tube with patency. Because of cervical regurgitation and the possible transmission from right to left side the sound heard later on the left side could not definitely be ascribed to the gas escaping from the left tube; 6 excursions at thirty-four seconds each. Fluoroscopy showed 2½ inch depth subphrenic pneumoperitoneum on left side at first, then transferred to right side by posture. Lipiodol injection January 31, 1930 (Fig. 4), by Dr. A. J. Bendick; 4 c.c. of lipiodol used. Pain severe on left side, less on the right side. Right

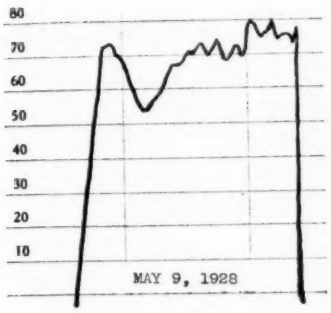

Fig. 2.—Insufflation with initial pressure rise to 70, showing shallow fluctuations 5 mm. Hg in depth.

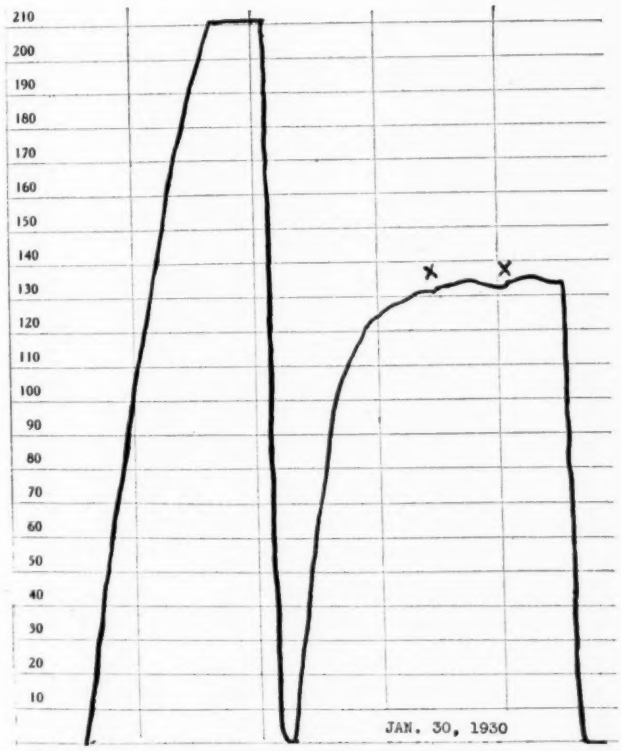

Fig. 3.—Insufflation; gas passed through second attempt in a parabolic curve from 120 to 135 mm. Hg.

Fig. 4.—Cannula in situ under pressure.

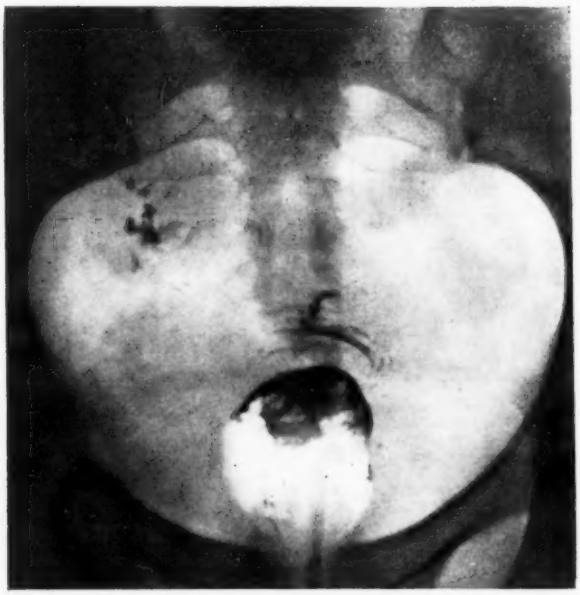

Fig. 5.—Film taken one-half hour later; lipiodol in peritoneum.

ampulla visualized; left tube not at all. Pressure up to 200 mm. Hg for one second as pain was severe. Right tube did not appear under the fluoroscope until the pressure reached 200 mm. Hg. Dr. Bendick's report: "The isthmus of the right tube is seen, it is long, measuring about 2½ inches in length and appears normal. The ampulla is fairly well filled; it does not appear dilated and shows peristalsis. At no time did any lipiodol enter any part of the left tube. A film taken one-half hour later (Fig. 5) showed a moderate amount of lipiodol out in the peritoneal cavity in the vicinity of the right ampulla. Traces were seen in the uterus; none in the left tube. A film taken eighteen hours later (Fig. 6) showed some lipiodol scattered in the free peritoneal cavity and none in the uterus or either of the tubes. These findings indicate the right tube to be normal in contour and patent; the left tube to be blocked at the uterine end."

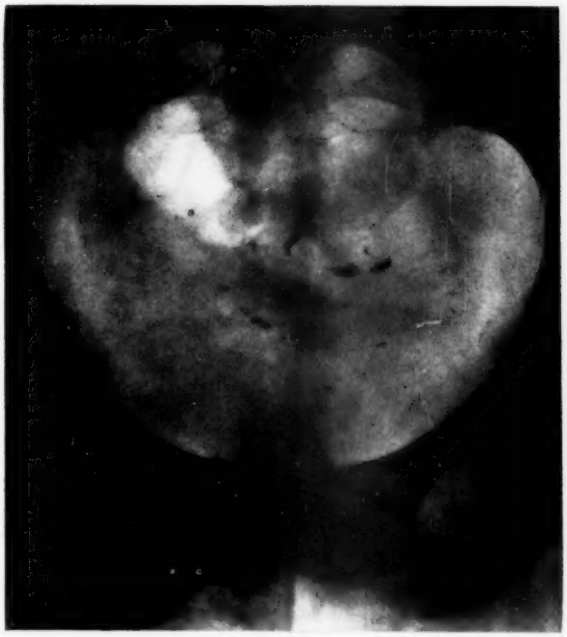

Fig. 6.—Film taken twenty-four hours later; lipiodol in peritoneum.

Comment.—Had the pressure been sustained with lipiodol the oil might also have entered the left tube. Apparently greater pressure is required to overcome a tight stricture with lipiodol than with gas. The permeability of the left tube in this case remains in doubt in spite of the lipiodol findings.

CASE 2.—(B. S.) Insufflation July 11, 1929 (Fig. 7), rose to 155 mm. Hg, describing a somewhat parabolic curve; slight bubbling regurgitation from cervix. Subphrenic pneumoperitoneum one-half inch meniscus on both sides. Pain in midline and slight pain on the left side. Two and one-half excursions at thirty-six seconds each.

Diagnosis.—Stricture of left tube with patency. Insufflation January 30, 1930 (Fig. 8), pressure rose to 160 mm. Hg, practically as on first insufflation, dropped gradually to 130 mm. Hg, without describing fluctuations, when the rate flow was changed from twenty-nine seconds to thirty-nine seconds per siphon excursion. It then dropped to 65 mm. Hg without describing fluctuations. Altogether 3¾ excur-

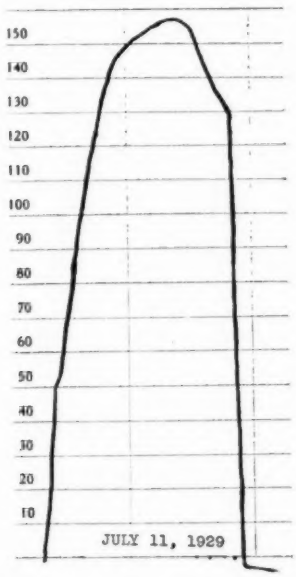

Fig. 7.—Insufflation; initial pressure rose to 155 mm. Hg, describing a somewhat parabolic curve.

Fig. 8.—Insufflation; initial pressure rose to 160 mm. Hg, describing a somewhat parabolic curve and dropping gently to 130 mm. Hg.

sions at twenty-nine seconds each and two excursions at thirty-nine seconds each. Pain was felt on the left side. Abdominal auscultation elicited constant gurgling from the tube on the left side. Fluoroscopy showed a left-sided pneumoperitoneum; pressure was increased to 200 mm. Hg with the lipiodol. (Figs. 9, 10, 11, and 12.)

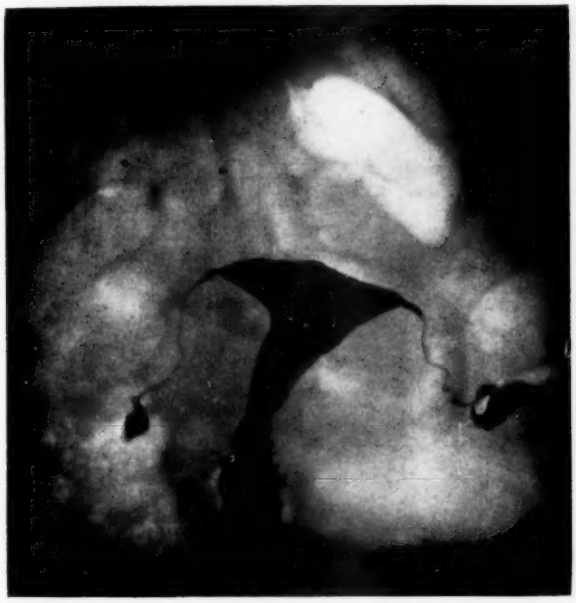

Fig. 9.—Cannula in situ under pressure.

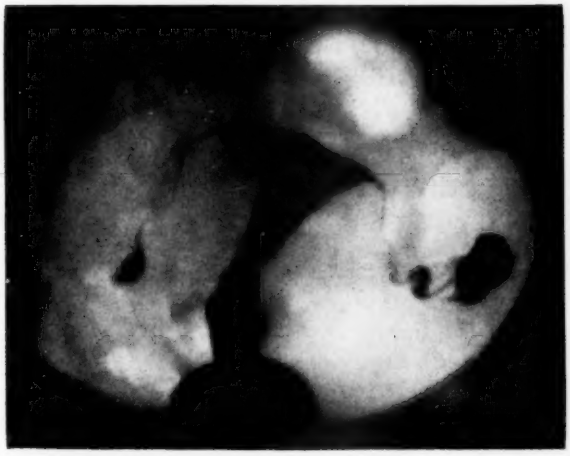

Fig. 10.—Pressure increased to 200 mm. Hg.

It certainly required more than one-half hour and possibly a few hours for the lipiodol to work its way through the stenosed lumen of the left tube, again demonstrating the greater amount of pressure required to overcome a strictured tube by lipiodol. The film taken five days later (Fig. 13) still showed a large quantity of lipiodol at the stenosed fimbria of the left tube. The point of stricture however in

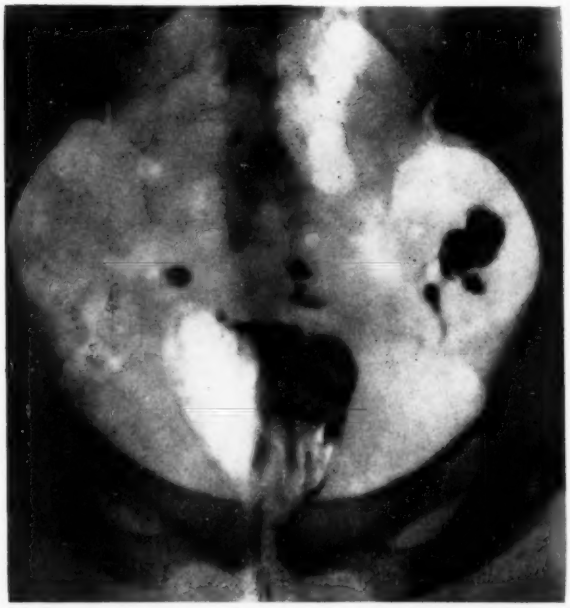

Fig. 11.—Film taken one-half hour later.

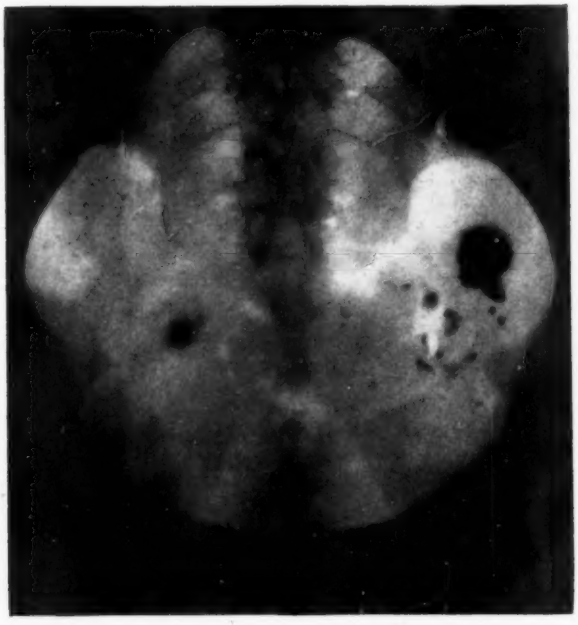

Fig. 12.—Film taken eighteen hours later.

the patent tube was at once evident on auscultation when CO_2 was used, the gurgling being heard over the left lower abdomen and not transmitted to the right lower abdomen in this case. The absence of an audible bruit on the right side indicated occlusion of the right tube at a pressure of 160 mm. Hg.

CASE 3.—(E. D.) Insufflation December 12, 1929, pressure rose to 205 mm. Hg, slight regurgitation from cervix causing a slight bend in the upward tracing and a sharper decline when the valve was shut from points *A* to *A'* (Fig. 14). A second attempt showed even a more pronounced bend in the upward tracing due to the cervical regurgitation. Subphrenic pneumoperitoneum is absent. Pain in midline.

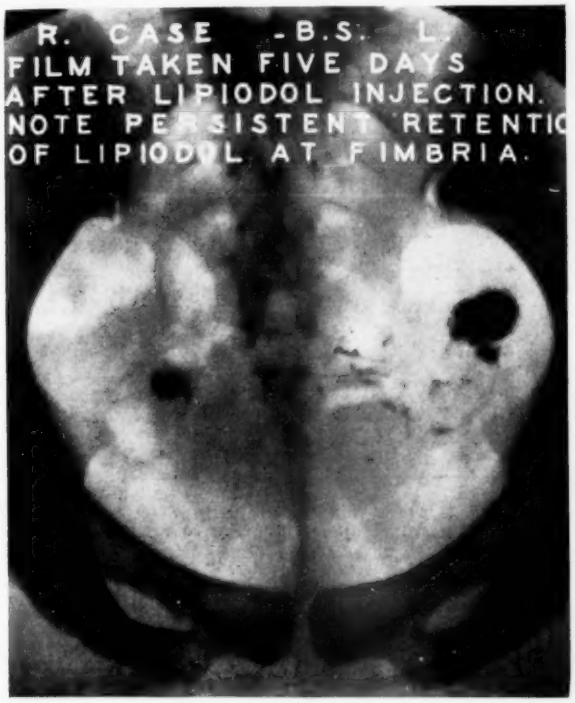

Fig. 13.—Film taken 5 days later.

Diagnosis.—Bilateral obstruction at the uterine end of the tubes.

A second insufflation, January 2, 1930, with cannula held more firmly in cervix, preventing cervical regurgitation; pressure rose in a straight line to 195 mm. Hg, and was maintained with the slightest fall due to very faint regurgitation from the cervix. Pain felt slightly to left, mostly in midline, and slightly to the right. Subphrenic pneumoperitoneum negative.

Diagnosis.—Bilateral stenosis at isthmus.

January 31, 1930, lipiodol injection by Dr. Bendick; 7 c.c. lipiodol used. Uterus filled at 40 mm. Hg. Pressure increased to 200 momentarily. The isthmus of the right tube was outlined for a distance of three-fourths of an inch where it ended rather abruptly. (Fig. 15.)

Comment.—When the stricture is situated within the isthmus a short distance from the uterine ostium, lateral pain during insufflation is not likely to occur.

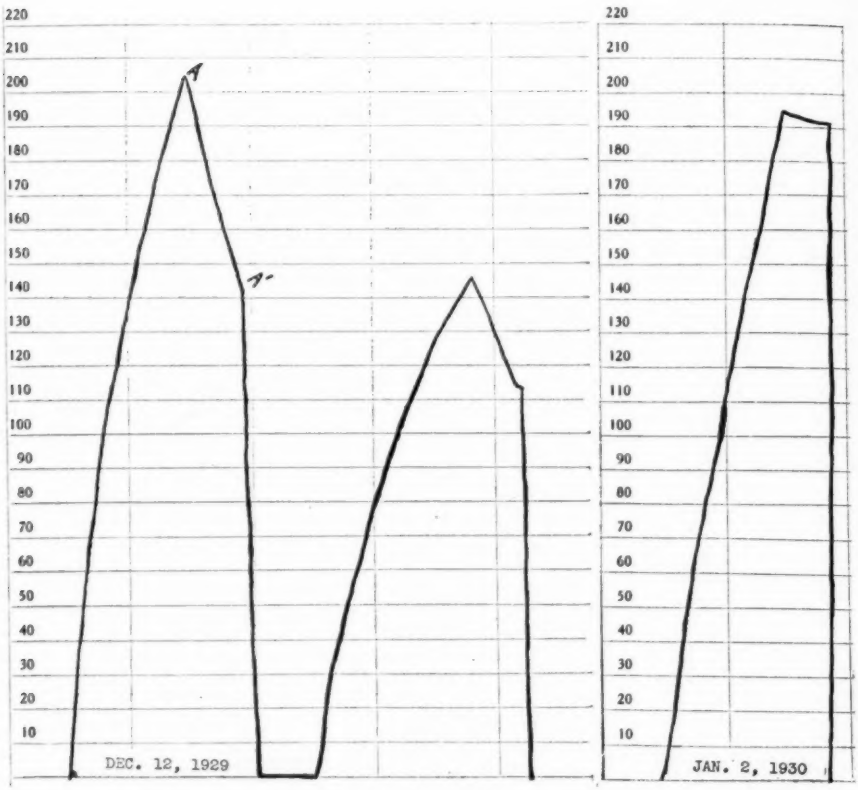

Fig. 14.—Insufflation—two attempts first sitting; in each instance slight drop due to regurgitation from cervix. Fluoroscopy negative.

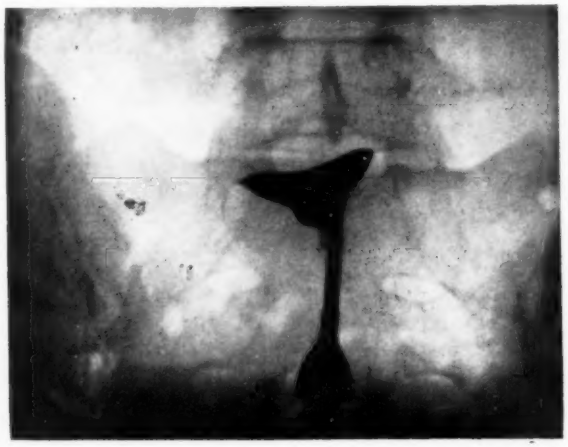

Fig. 15.—Lipiodol shows isthmus of right tube outlined at a distance of three-fourths of an inch where it ended rather abruptly.

Midline pain referable to the uterine distention is the rule. For practical purposes it is the same whether the intramural portion or the proximal isthmic portion of the tube is blocked. As in each case if an operation is done, it would necessarily be an isthmic resection and ampullary implantation in the uterine cavity.

PROGNOSTIC VALUE OF THE CURVE WITH REFERENCE TO TUBAL STRICTURE

When normal peristalsis is exhibited by the tubes during insufflation and the initial pressure is below 100 mm. Hg, the prognosis as far as pregnancy is concerned is good, i.e., provided all other factors possibly entering into the cause of the sterility have been satisfactorily accounted for. When the pressure is high at the initial rise and the sharp drop is then followed by more or less normal peristalsis, it indicates the presence of spasm. This may be relieved by atropine or it may not require further treatment. The prognosis is good in such cases. But when the initial rise is high and the drop is gradual and there are no oscillations and especially if the character of this curve is not much altered in subsequent tests, the prognosis is poor. In a certain proportion of cases repeated insufflation appears to improve the status of the tubes as indicated by lower pressures and the exhibition of more typical peristaltic motions. The possibility of tubal pregnancy in such instances must be borne in mind.

In a number of instances where the test could be prolonged for more than a minute or two the possibility of a prompt therapeutic action was suggested by the improved kymographic curve which was obtained toward the end of the insufflation. Apparently some obstruction was thus overcome. Whether this be in the nature of a mild agglutination or due to circumscribed adhesions the tubes nevertheless appear to straighten out, for the pressure is reduced and there is a tendency to show oscillations characteristic of peristaltic motions.

The best proof of the therapeutic value of uterotubal insufflation in such cases is of course seen when pregnancy results. A relatively small number of patients have become pregnant in my series who have had varying degrees of obstruction. (In 27 out of 205 cases of pregnancy following peruterine insufflation, the initial pressure was 100 mm. Hg or more. In 12 of these the pressure reached 200 mm. Hg the first time and normal limits on a second insufflation.[16])

In several of my cases patency was demonstrable by uterotubal insufflation after lipiodol injection failed to show any patency. The question naturally arises whether some therapeutic action can be ascribed to the lipiodol. These cases are few indeed and I should hesitate to answer this question in the affirmative until more experience has been gained in this connection; because in a very few cases with nonpatency (at pressures of 200 mm. Hg), the tubes may become patient after a lapse of time without having had recourse to lipiodol or any treatment whatever. It is a mistake therefore to give an ab-

solutely unfavorable prognosis even when lipiodol fails to demonstrate patency. For CO_2 uterotubal insufflation at least three tests are necessary to make an unfavorable prognosis; in this respect such insufflations can certainly be carried out more readily than lipiodol injections. I have seldom failed to get my patients to repeat the gas test three or more times when necessary. The same cannot be said for lipiodol. Some patients who would defer an operative procedure indefinitely do not mind repeated insufflation, realizing how insignificant they are compared to a laparotomy.

Inasmuch as we cannot yet promise enthusiastic results from laparotomy and tubal plastic operations, we are forced to yield to the request of some patients to persist in our efforts with CO_2 uterotubal insufflation and lipiodol injections.

In this connection it may be well to point out that the occasional report of pregnancy taking place after the tubes have been found to be nonpatent[17] may be explained by the fact that only one test was carried out. Spasm may have accounted for the high pressure reached or the tubes may have been opened without giving frank evidence of patency. Although I have often hoped this might be the case in certain patients who ardently desired children I have never seen a pregnancy occur when three successive tests failed to show patency at 200 mm. Hg. The prognosis is obviously much better when a second insufflation is associated with lower pressure levels.

The strictures encountered in retroflexion and retroversion are noteworthy. By uterotubal insufflation one finds not infrequently an obstruction at the uterine ostiae, the intramural portion or the proximal portion of the isthmus of both tubes. Sometimes one can overcome the obstruction by increasing the pressure. There need be no adhesions at the exit of the tubes from the uterus nor need there be agglutinations of its lumen at that junction. Case A. W. is a beautiful example in point where both CO_2 uterotubal insufflation as well as lipiodol injection showed a distinct stenosis at or near the intramural portion. Laparotomy at Mt. Sinai Hospital Private Pavilion showed the uterus bound down posteriorly by dense adhesions to the sigmoid and the tubes were kinked at the isthmus just short of their exit from uterus. An insufflation done three weeks after the ventrosuspension showed a perfectly normal graph with typical peristalsis.

This finding in retroversion and retroflexion has been noted many times. Wherever it is possible to correct the position of the uterus, repeated insufflation can also determine the correction of the tubal kinks. When these are not straightened out by the reposition of the uterus, it is safe to conclude that there are adhesions surrounding the tubes near the uterine ostiae. Before deciding upon a laparotomy for the correction of the malposition, an insufflation should be done to decide the point of tubal patency. In instances where the tubes are

found to be freely patent in spite of the malposition of the uterus it is doubtful whether an operation for its correction would do any good as far as the sterility is concerned. In my opinion this should prove the determining point for or against laparotomy.

Another question that arises is whether one should subject the wife to a tubal insufflation when it is known definitely that her husband is sterile. There are occasional cases in which the woman desires to know whether she has not been rendered sterile through her husband or whether in considering a remarriage she should not first be certain of the possibility of conceiving. In such cases it is certainly justifiable to do a uterotubal insufflation. In a number of such marriages the wife has been found to have tubal obstructions and strictures which in themselves would act as deterrents to pregnancy.

The pain experienced by the patient in some cases of tubal stricture is not well tolerated. In a few cases I have been obliged to stop the test when 160 mm. Hg had been reached. It is not always a hypersensitive patient in whom this is noticed. The relatively high pressure indicates at once the presence of an obstruction and the pain radiation locates its nature and situation. It has been seldom necessary to resort to the administration of morphine to carry out a second insufflation in these intolerant patients. The vast majority support the test very readily. Atropine has been given as a preliminary measure in a few cases. The element of fear is sometimes troublesome in nervous patients. As CO_2 uterotubal insufflation requires less time than lipiodol injection and as it may be carried out in a light room, fear is less likely to occur. The pain reactions are perhaps for these reasons somewhat more exaggerated when lipiodol is used. The situation and radiation of pain responses due to tubal distention are practically the same in each case.

It may be that some other gas which may have radio opacity as well as increased resorbability will be available in the future and thus supplant CO_2. Meantime, CO_2 has proved almost ideal as it is nonirritating and is capable of very rapid resorption from the peritoneal cavity. With the small amount necessary to employ for the test the gas may disappear from beneath the diaphragm in a few minutes. By placing the patient in a semi-Trendelenburg posture on the examining table the discomfort felt in the shoulders due to referred pain sensations from the diaphragm is reduced materially. In the average case the patient need experience no more pain than a sense of discomfort in the shoulders for the brief space of time required for fluoroscopy. Fluoroscopy is best carried out the moment the insufflation is completed. Immediately afterward if a subphrenic meniscus of more than one-half inch in depth is produced the patient may be made comfortable by placing her upon the examining table with the head lower than the legs.

It is not my purpose to press the claims of superiority of this method over lipiodol injection. There can be no doubt that in certain well defined cases lipiodol has its uses. As a contrast medium in the pelvis CO_2 is certainly not to be compared with lipiodol in the slightest degree since even the uterine cavity cannot, except in rare instances, be visualized with gas and the tubes practically never.[13] In the subphrenic space however the CO_2 gas renders exquisite contrast between the lungs and heart above and the liver, stomach, and spleen below the diaphragm.

Our chief concern must be in estimating the diagnostic and therapeutic service of each method as now employed for routine purposes and of both methods combined when necessary.

CONCLUSION

The method of uterotubal insufflation can determine the fact of tubal patency and of nonpatency. It can in the vast majority of the cases of nonpatent tubes render information as to the site of the obstruction at the uterine end or the fimbriated end and thus aid in a decision for or against operative intervention to open the tubes. With the help of abdominal auscultation and careful notation of the pelvic pain reaction during the examination it is often possible also to locate the tube which may be the seat of a permeable stricture. The diagnosis of bilateral permeable strictures is more difficult whether gas or iodized oil is used. With the aid of the kymograph certain alterations of tubal function such as uterotubal spasm and those due to peritubal adhesions are also readily diagnosticated.

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911 PARK AVENUE.

(For discussion, see page 127.)

RECONSTRUCTION OF THE CERVICAL LIGAMENTS FOLLOWING COMPLETE HYSTERECTOMY*

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WHEN I first undertook to do a complete hysterectomy it was difficult to find an easy method to close the vault of the vagina and utilize the whole support of the cervix. When I saw my cases in the follow-up, I found myself confronted with patients who had vaginal vaults consisting of a thin layer of tissue between the vagina and the abdomen, because the original supports had retracted, the real ligaments had been omitted in the closure and the vaginal vault began to fall down. Could this not be overcome? I believe so and in March, 1923 I accomplished the utilization of the complete support but using all of the ligaments to oppose each other, and thereby constructing a substantial diaphragm above the vagina. The operative time was also sufficiently short to warrant continuation of this procedure. Since that time I have used it consistently when the complete removal of the uterus has been indicated.

This report is made up of 110 consecutive cases, 10 being private cases done at the Booth Memorial Hospital with no deaths, 23 being private cases done at the Woman's Hospital with one death, 60 being ward cases done at the Woman's Hospital with one death and 17 being ward cases done at the Woman's Hospital by interns under my direction, with no death. This gives a mortality rate of 1.8 per cent.

The technic of the hysterectomy does not appear in this paper except in as much as is required to prepare the tissues for reconstruction of the cervical ligaments. The discussion of the relative merits of complete and supravaginal hysterectomy is also omitted.

While I have for seven years used this method of completely utilizing the cervical ligaments after complete hysterectomy, I claim no priority for the principle since several members of this Society may have performed the operation for some time, yet, the procedures thus far described differ only in that they either leave the ligaments undisturbed or only partially utilize them. In quite a number of instances, I have noted the relaxed and injured ligaments, the relaxed wall beneath the bladder, the relaxed uterosacral ligaments and the broad deep culdesac, each of which I am certain can be improved by a complete and deliberate use of the ligaments. Therefore I have proposed the following standard to be attained:

*Read at a meeting of the New York Obstetrical Society, February 11, 1930.

1. Complete utilization of every cervical support.

2. No shortening of the vagina but rather lengthening it.

3. Approximation of the muscle supports of the cervix so that they continue to actively oppose each other.

4. Strengthening the anterior wall and making an improved support for the bladder.

5. Reducing to a minimum the postoperative anastomosis of the vessels of the vaginal vault.

6. Reducing the size of the culdesac of Douglas and if so desired obliterating it to do away with an enterocele.

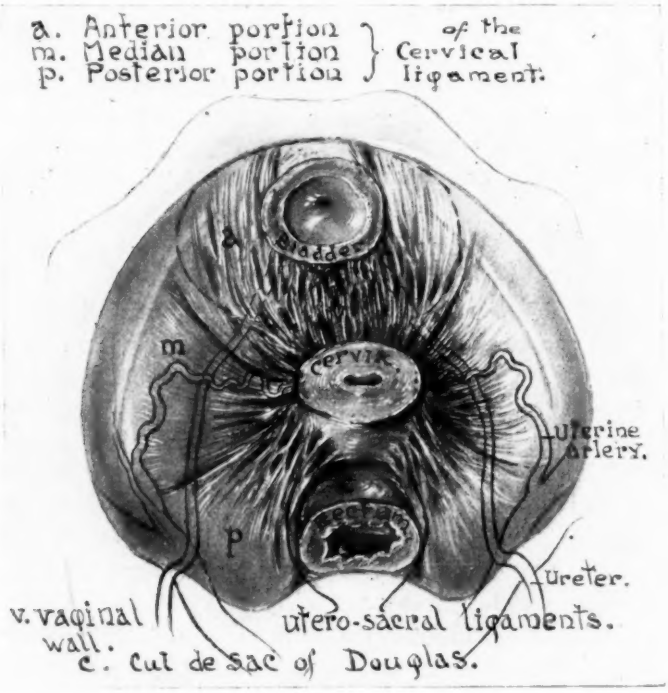

Fig. 1.

THE CERVICAL LIGAMENTS

One cannot describe the anterior vaginal wall and the cervical supports without linking the names of Sims, Emmett, J. Riddle Goffe, Tweedy, Hadra, Martin, Frank, Ward, Rawls, Farrar, Dickinson, Bissell, Kelly, Noble, Watkins, Mayo, Polk, Halban and Tandler, Byron H. Goff and Nyulasy.

Nyulasy[1] studied the uterine support both in the fetus and the adult and came to the conclusion that the support of the uterus was derived from the pelvic wall. Byron H. Goff[2] writing recently, explains clearly that the cervical ligament fibers are all derived from the fascia endopelvina which lies in contact with the muscle fasciae but is separate and distinct from these fasciae, being joined to them by connective tissue only. The fascia endopelvina gives off from its pelvic wall por-

tion, a network of connective tissue to fasten itself into and about the musculature of the cervix. The external part, lying between the pelvic wall and the course of the ureter contains no muscular tissue while the internal part lying between the course of the ureters and the cervix is filled with smooth muscle tissue, budded out from the cervix. The ureters, therefore, from their position are protected during parturition. The network of the fibers of the support are absent only anterior to the urethra and posterior to the rectum.

Both Martin and Nyulasy, have divided the supports into the anterior, median and posterior portions.

The posterior ligament fibers are more numerous and more concentrated, forming the uterosacral ligaments.

The bladder lies upon the two anterior portions and the base of the bladder is kept taut by two fibromuscular (Nyulasy) bands connected into the cervix on either side. *It is important in all operative procedures either not to disturb these bands (again derived from the fascia*

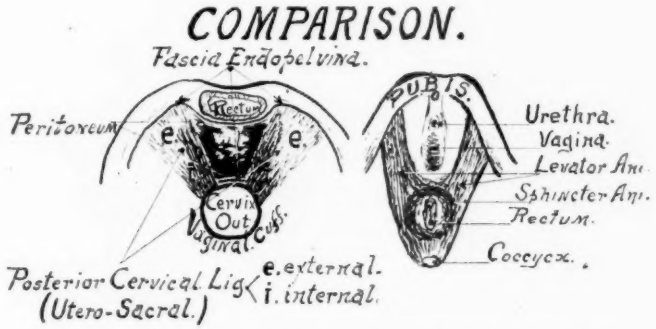

Fig. 2.

pelvina) or to restore them to their original positions since the floor of the bladder depends upon them for support.

Fig. 1 illustrates the cervical ligament, its anterior, median, and posterior portions, and the relation of the ureters, uterine artery, and the bladder to this structure. The muscle from the cervix which digitates with the connective tissue of the ligament, out about as far as the course of the ureter, is not inserted in Fig. 1.

PREVIOUS OPERATIVE PROCEDURES

A number of simple methods of removing the cervix with the uterus has been described but in the closure of the vaginal opening the cervical ligaments have not been utilized to satisfy the standard set up by me.

Worrall[3] describes a technic by which the cervix is shelled out of its supporting collar and the closure is effected by four figure-of-eight sutures. No correction can be made in attenuated or relaxed ligaments and the supports are unchanged by operation.

Polak[4] in his excellent article states that "Furthermore in this technic we have taken care to preserve the uterosacral ligaments, and they are also attached to and sutured into the vaginal vault, thus maintaining its high position in the pelvis."

Nyulasy[1] after cutting away the uterus states that "The stumps on each side are secured by a continuous ligature, the free ends being used to close the rectovesical gap." No illustration is given.

Lahey[5] presents a similar method to Worrall's of utilizing the cervical ligaments.

Richardson's[6] method has some similarity to Polak's.

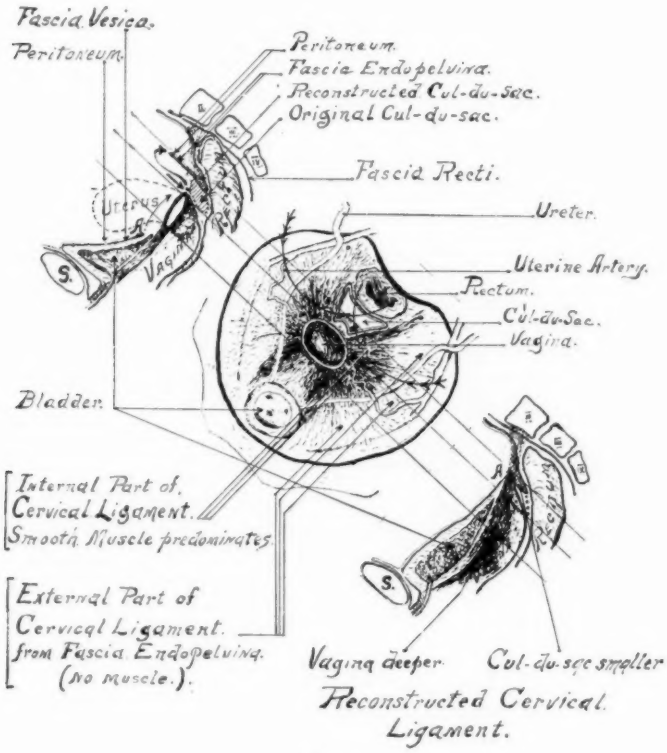

Fig. 3.

OPERATIVE EXPLANATION

In Fig. 2 I have endeavored to compare the relation of the uterosacral ligaments and the cervix with the relation of the levator ani muscles and the rectum. Should the levator ani muscles become injured or attenuated in a laceration of the pelvic floor, an operative procedure would immediately be indicated and done. When an injury or relaxation of the uterosacral ligaments takes place, it should also be corrected and can be corrected after the cervix has been removed.

In Fig. 3 the upper illustration shows transversely the relative position of the bladder, the cervical supports, the fascia of the culdesac (fascia endopelvina), the vagina, and the rectum. The anterior por-

tion of the fascia of the culdesac is loosely attached to the vaginal wall of the posterior fornix and loosely attached to the rectum. It can, therefore, be separated and lifted up to obliterate the culdesac.

The center illustration is a vertical view of the plane at right angles to the upper illustration. The uterosacral ligaments can be ligated at

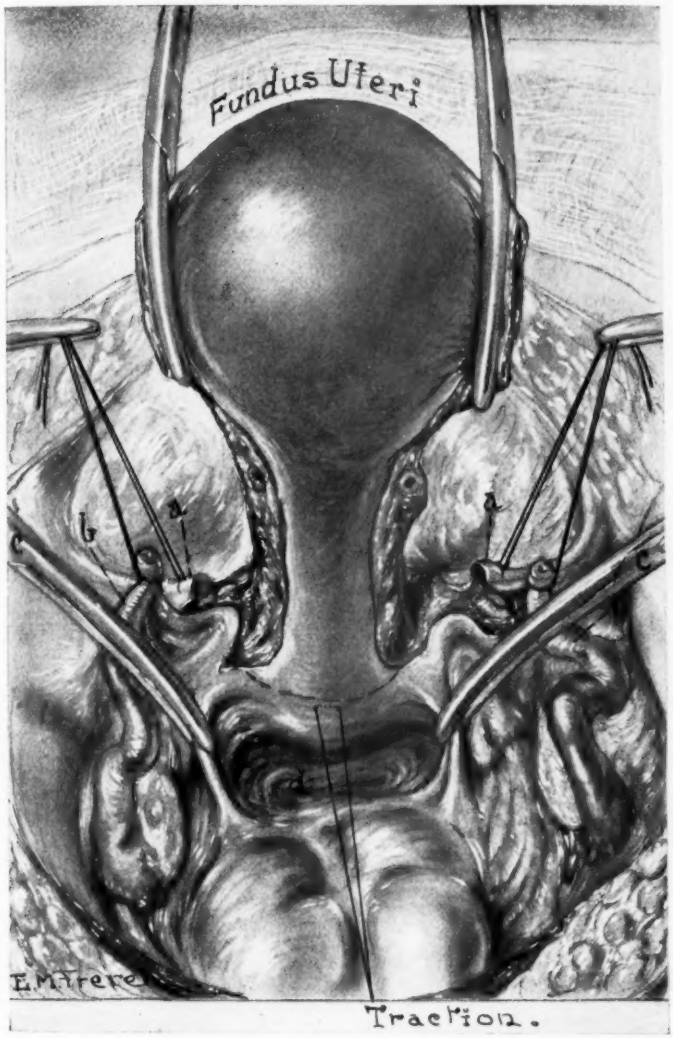

Fig. 4.—*a*, Round ligaments. *b*, Fallopian tubes. *c*, Clamps on uterosacral ligaments. *d*, Culdesac.

any point desired, cut away and swung on the arch of the circle indicated and fastened to its corresponding ligament in the midline, thus reducing materially the entrance to the culdesac. The fascia endopelvina of the culdesac (at any point desired), the fascia vesica and peritoneum of the bladder and the posterior point of the vaginal cuff

are attached to the point of union of the uterosacral ligaments. The transverse or median portions of the ligament are then approximated end to end as are the free ends of the anterior portions. The fascia vesica and fascia endopelvina of the culdesac are now continuous and the vaginal vault is made up entirely of cervical supports, so that the diaphragm between the abdominal cavity and the vagina becomes com-

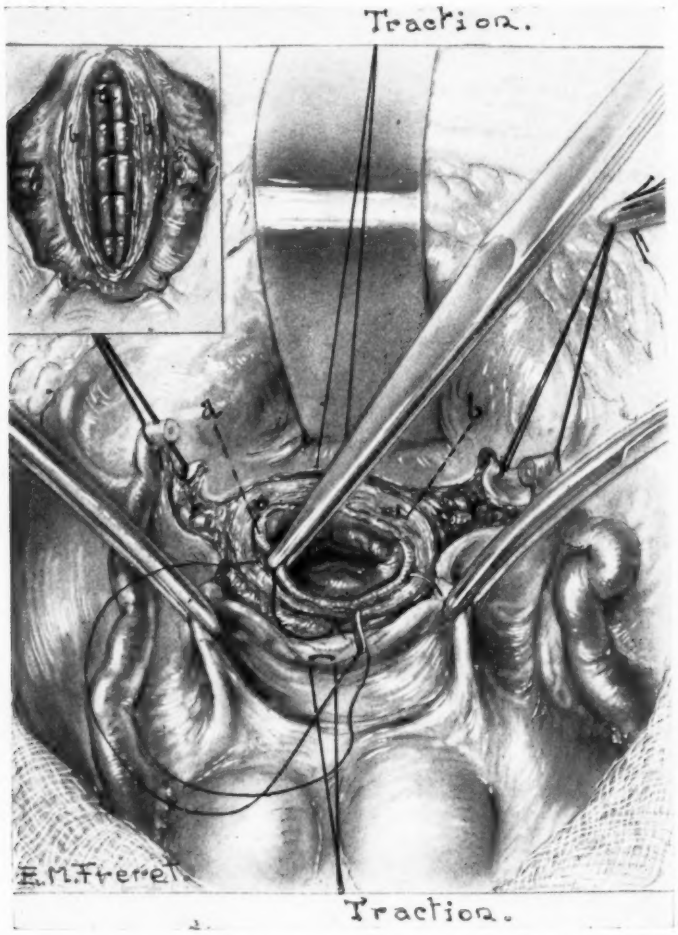

Fig. 5.—*a*, Vaginal mucosa. *b*, Anterior vaginal tissue, contains cervical ligaments.

plete except the space where the rectum passes, and the small culdesac lies anterior to it. The vagina is now deeper and the bladder has a support equal to or perhaps more substantial than its original. Since the cervix has been removed all infected areas are absent from this diaphragm. The culdesac is narrower and shallower while the vagina is deeper. Theoretically it is so done, but can it be accomplished simply and expeditiously? (See Fig. 4.)

OPERATIVE PROCEDURE

All the blood supply is ligated without clamping (except the return flow through the fundus), and the pedicles distal to the ligatures are left long. Traction sutures are put in the vaginal wall anterior and posterior to the cervix. The vagina is entered posterior to the cervix and the vaginal wall is cut close to the cervix. The uterosacral ligaments are ligated as far as one desires from the cervix consistent with the shaping of the culdesac and the complete portion of the ligament (not the edge) included in the ligature. The first suture of No. 2 chromic catgut includes the peritoneum, and fascia of the culdesac and

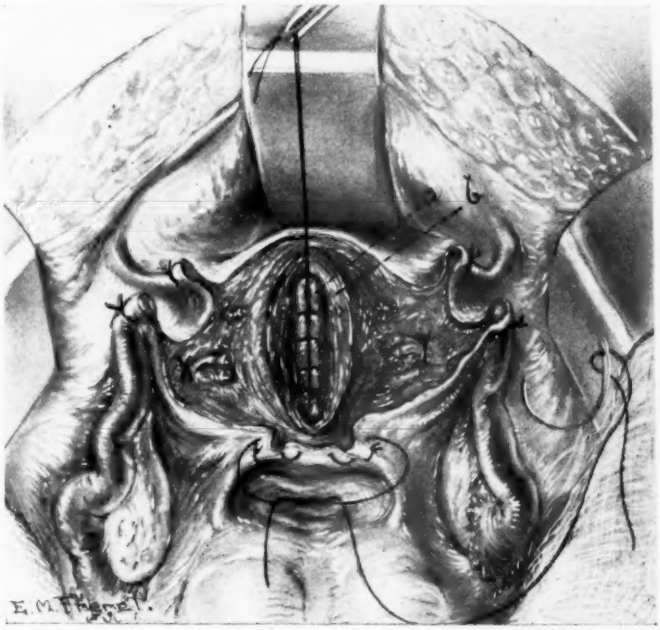

Fig. 6.—*a*, Vaginal mucosa. *b*, Anterior vaginal tissue, contains cervical ligaments.

the vaginal cuff all in the midline posteriorly. This ligature is tied and one end is continued as a submucous mattress suture toward the bladder thus everting the vaginal cuff into the vagina. It is then tied. The second No. 2 chromic catgut suture includes in order, the distal end of the uterosacral ligament near its ligature, the fascia of the culdesac, the vaginal cuff (or the beginning of the first suture), the fascia of the culdesac, and the end of the other uterosacral ligament. This ligature is tied fixing the posterior point of the vagina. One end is carried forward as a mattress suture, bringing together in the midline the fasciomuscular ends of the cervical ligament (a very definite structure when seen at operation). It is tied at the end of the closure. A figure-of-eight suture is passed through the midline and through the ends of

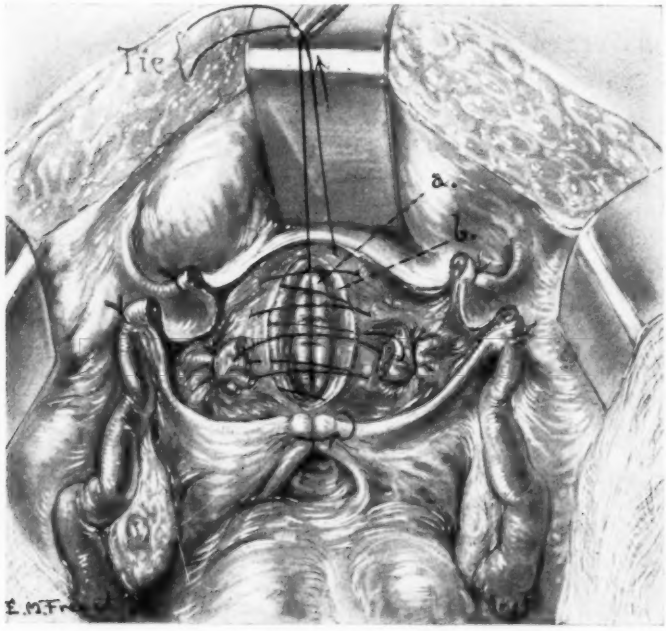

Fig. 7.—*a*, Vaginal mucosa. *b*, Anterior vaginal tissue.

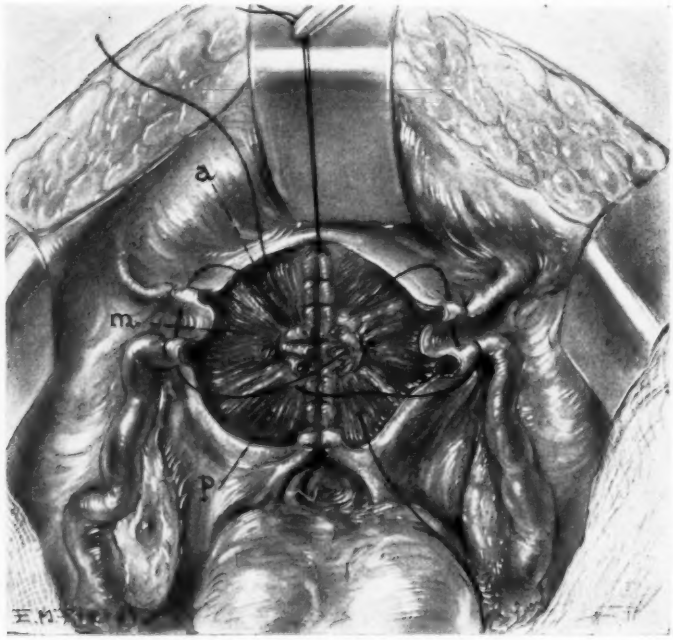

Fig. 8.—*a*, Anterior portion, *m*, median portion, *p*, posterior portion of the cervical ligament.

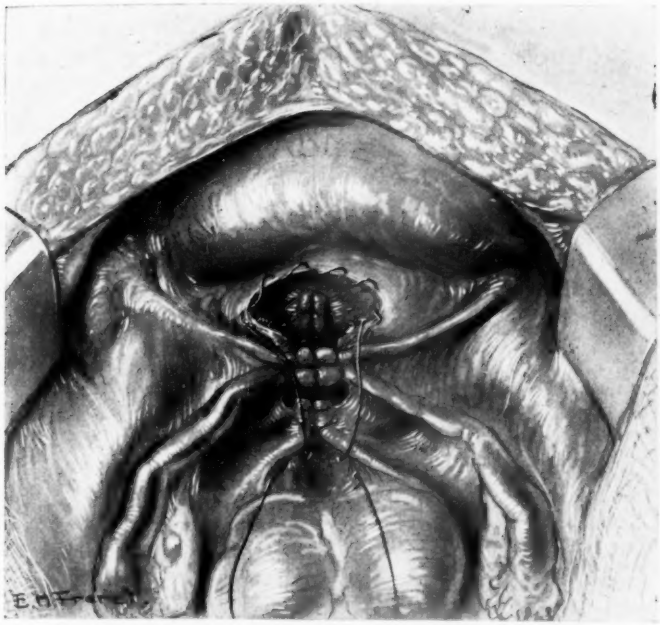

Fig. 9.

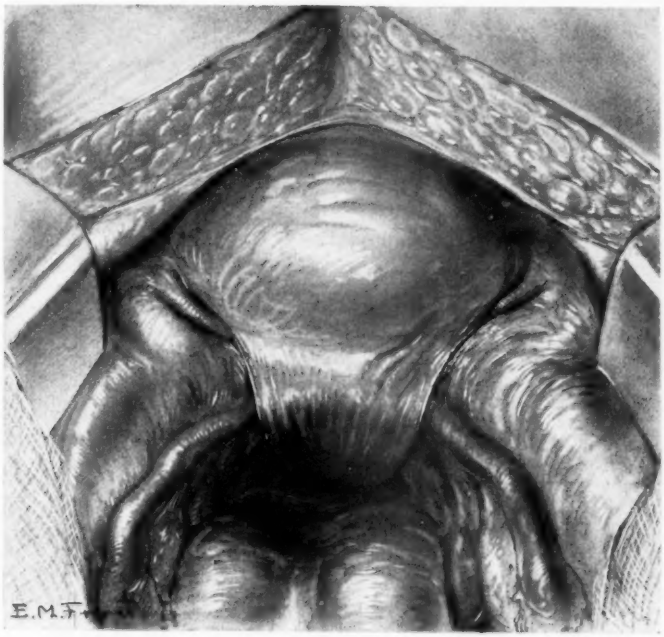

Fig. 10.

the round ligaments and tubes, is drawn tight and tied. This is done as an easy method of peritonealizing the raw surfaces. A suture is begun in the culdesac and passed through the fascia vesica as illustrated and tied in the culdesac to complete peritonealization. The abdomen is closed by the layer method.

THE RESULTS

Operations.—In order that a systematic analysis be made it was decided to serially study the patients according to their operation, and a chart was so arranged. The serial numbers appearing at the left of each chart is followed through in the successive charts, e.g., serial No. 3, each patient had a complete hysterectomy and an appendectomy, etc. Table I is self-explanatory.

TABLE I

	NO. OF CASES
Hysterectomy, complete and	
1. No other procedure	2
2. No other procedure (appendix previously removed)	2
3. Appendectomy	21
4. Appendectomy, adhesions	8
5. Adhesions	1
6. Adhesions (appendix out)	1
7. Unilateral salpingo-oophorectomy	2
8. Unilateral salpingo-oophorectomy and appendectomy	8
9. Unilateral salpingo-oophorectomy and adhesions	2
10. Unilateral salpingo-oophorectomy, appendectomy and adhesions	5
11. Bilateral salpingectomy, unilateral oophorectomy and resection of ovary	1
12. Bilateral salpingectomy, unilateral oophorectomy and appendectomy	2
13. Bilateral salpingectomy, unilateral oophorectomy and appendectomy, adhesions	1
14. Bilateral salpingo-oophorectomy	4
15. Bilateral salpingo-oophorectomy and appendectomy	18
16. Bilateral salpingo-oophorectomy, appendectomy and adhesions	14
17. Bilateral salpingo-oophorectomy and adhesions	4
18. Bilateral salpingo-oophorectomy and adhesions (appendix out)	1
Portion of tubes and ovaries removed at previous operation (below)	
19. Tubo-ovarian tissue now all removed (appendix removed previously)	5
20. Tubo-ovarian tissue now all removed and adhesions	4
21. Tubo-ovarian tissue now all removed and appendectomy	1
22. Tubo-ovarian tissue now all removed, appendectomy, and adhesions	1
23. Tubo-ovarian tissue now all removed, appendectomy, and adhesions right ovary left	1
24. Tubo-ovarian tissue now all removed, appendectomy, adhesions, left tube and ovary left	1

POSTOPERATIVE OBSERVATIONS (IN HOSPITAL)

For operation 104 patients had an induction anesthesia of nitrous oxide and oxygen followed by ether, 2 had a spinal anesthesia augmented by ether and 4 had spinal anesthesia only.

Morbidity.—By averaging the total number of postoperative days when the temperature was greater than 102° F., each patient was found

to have such a temperature for 0.78 days and by averaging the total number of postoperative days when the temperature was greater than 100° each patient was found to have such a temperature for five and one-half days.

Wound Healing.—Of the 110 cases, 99 had primary union (Class A), 9 had primary union except slight minor defect (Class B), while 2 had a major infection with granulation (Class C).

Complications.—These are shown in Table II. It will be observed that one death occurred as the result of tetanus and peritonitis while the other death was due to peritonitis.

Pneumonia occurred twice, one in whom the appendix was removed at operation and the other in whom the appendix was not disturbed.

Infaret occurred once and thrombophlebitis once, in patients from whom the appendix was removed.

Blood in the urine occurred once in a patient who had a long operation for removal of a bicornuate uterus with myoma.

Cystitis appeared twice, pyelitis five times and colitis once.

TABLE II. COMPLICATIONS

SERIAL NO.	NO. OF CASES	THROMBO-PHLEBITIS	CYS-TITIS	PYEL-ITIS	CO-LITIS	PNEU-MONIA	IN-FARCT	WOUND MAJOR IN-FECTION	BLOOD IN URINE	TET-ANUS	PERIT-ONITIS
1	2 c										
2	2 a										
3	21*			2		1		1			
4	8*			1							
5	1 c										
6	1 a										
7	2 c										
8	8*										
9	2 c										
10	5*										
11	1 c										
12	2*										
13	1*										
14	4 c					1			1		
15	18*		1	1	1		1			1 Death	
16	14*	1		1				1			
17	4 c										1 Death
18	1 a										
19	5 a		1								
20	4 c										
21	1*										
22	1*										
23	1 c										
24	1 c										
Total	100	1	2	5	1	2	1	2	1	1	2

*Appendectomy in 79 Cases.
a Appendectomy previously in 9 Cases.
c Appendix remains in 22 Cases.

TABLE III. PATHOLOGY

SERIAL NO.	NO. OF CASES	MYOMA	POLYP	CARCINOMA OF FUNDUS	FIBROSIS	ADENOMYOSIS	CERVICITIS	ENDOMETRITIS	SALPINGITIS	CHRONIC APPENDICITIS	ADHESIONS	OVARIAN CYSTS	PREGNANCY	HYPERPLASIA ENDOMETRIUM
1	2	1					1	1						
2	2	2		2	1			1						
3	21*	16	4	1	5	1	3		1	2		1	1	1
4	8*	4	1		1		2			2			1	
5	1	1												
6	1					1					1			
7	2	1		1					1				1	
8	8*	8		1			3		1	1		4		
9	2	7					1		1	2		1		
10	5*	5							2					
11	1	1							1					
12	2*	1					1		1					
13	1*				1									
14	4	3			1				1			1		
15	18*	11			1	1	1	1	3	4	1	6		1
16	14*	13	1			2	3		6	1	1	5		
17	4	3	1	1		1	2		2	1				
18	1								1					
19	5	1			2	2	1	1 TB	1			2		
20	4	4										1	1	
21	1*													
22	1*						1		1			1		
23	1	1										1		
24	1	1			1									
Total	110	79	6	5	13	8	19	4	23	13	3	23	4	2

*Appendectomy in 79 cases.

PATHOLOGY

The pathology chart (Table III) is self-explanatory excepting that the indications for removing both the cervix and the uterus do not wholly appear herein. Adenomyosis occurred in 8 cases and fibrosis in 13 cases, all of which it were well the uterus was removed. Pregnancy occurred 4 times in complication with myoma. Endometritis occurred 4 times, once in a patient having tuberculosis who had had her tubes and ovaries removed at a previous operation. They were also tuberculous. Cervicitis occurred in 19 cases and was associated with bleeding in some of them and with myoma in others. Persistent vaginal discharge was not the sequence of any postoperative cervicitis and any discharge which came from the cervix before operation disappeared following its removal.

FOLLOW-UP

The total number of cases operated upon was 110, and 13 of these never returned, leaving 97 to analyze. Of this number 80 were satisfactory, 2 were failures, 3 partially satisfactory, 1 died of carcinoma of the kidney two years later, 5 had carcinoma of the fundus, and 1 had sarcoma of the fundus. Five are still being treated for some condition developed since leaving the hospital.

In two cases the vaginae were shortened, their depths being about 5 cm. and one had a constriction develop after operation which later entirely passed away but left the patient with a persistent vaginitis. Two have been classified as complete failures. One because she developed a tubovaginal sinus which intermittently emptied a discharge into the vagina. On repeated examination this sinus was never found. I lost track of this patient. The second was a patient who had two vaginal operations for prolapse, both of which had failed and I found a soft mass filling the culdesac which I believed to be a cyst, and as she had appendicitis symptoms, an abdominal operation was done. The mass proved to be perirectal fat and could not be removed and scarcely any ligaments could be found although what were there were utilized, but the result was a failure. A pessary kept this patient comfortable and a secondary pelvic floor was contemplated but never done. Five carcinomas and one sarcoma are being followed with no evidence of any recurrence but it is rather early for metastases. Three are partially satisfactory, one having intermittent left pelvic pain, one having persistent vaginitis, and one having a reinfected urethra and vaginal mucosa after leaving the hospital. One private case had an operation for carcinoma of the kidney one and one-half years after this operation and died six months later. Seventy-nine were in excellent health and had either no complaint or only very minor ones. Vaginal discharge occurred in seven patients. Four of these were incisional dis-

TABLE IV. FOLLOW-UP

SERIAL NO.	NO. OF CASES	EXCELLENT HEALTH	VAGINAL ABNORMALITY	VAGINAL DISCHARGE	FREQUENCY	PYELITIS	COLITIS G. I.	ADNEXAL AREA	OVARIAN CYSTS	ORTHOPEDIC	KELOID	RECURRENCE OF CARCINOMA	CARCINOMA OF KIDNEY	MENOPAUSE	FAILURE	PARTIAL SATISFACTORY	SATISFACTORY
1	2	1															1
2	2	2															2
3	21*	15	1	1			2		2	1	1	(2) 0			1	1	16
4	8*	8							1								6
5	1	1															1
6	1	1		1							1						1
7	2	2												1			1
8	8*	7							1	1		(1) ?		1			7
9	2	2	1							1				1			1
10	5*	3															4
11	1	?															0
12	2*	2															2
13	1*	1															1
14	4	3	1	1	1									2	1		2
15	18*	10?		1	2	2	1		1	1		(2) 0		4		1	14
16	14*	10?	1	1									1	1			11
17	4	2			1		1			1		(1) ?					2
18	1	1						1									0
19	5	3		1	1				1					1		1	3
20	4	1															1
21	1*	1						1						1			1
22	1*	1		1													1
23	1	1															1
24	1	1															1
Total	110	79	4	7	5	2	4	2	6	5	2		1	12	2	3	80

*Appendectomy in 79 cases.

charge which cleared up with one application of 10 per cent silver nitrate, but the other three had persistent discharges and were classified as partially satisfactory. Frequency of urination occurred in five cases, one appearing fifteen months after operation which responded to treatment in the Urological Department. Three other patients were soon relieved but the one who had a reinfection of the vagina also had a trigonitis and a urethritis which did not respond to treatment. Pyelitis and colitis were temporary and no case was persistent. Two patients who had had their ovaries removed were stated to have an ovarian cyst, but whatever this was, it was only transient. Only one had an ovarian cyst about 4 cm. in diameter which remained but gave no symptoms. Three had ovarian cysts which lasted from six to twelve months with only slight symptoms, and two patients who had had complete hysterectomy had pain in the adnexal areas for several months after operation. Five patients had orthopedic conditions which were either relieved or much improved after treatment. Two had stubborn keloids with some pain. Thirty-five patients retained both their ovaries and no menopause symptoms were noted. Sixty-two patients had one ovary or part of one ovary left after operation and of these, ten had menopause symptoms of varying degrees, most of which responded to Varium given by mouth thus relieving their symptoms. Thirteen patients had no ovarian tissue left and of these, two only had symptoms noted.

THE VAGINAL VAULT

It has been interesting to note that in making the follow-up examination that the vaginal vault in the majority of cases has a firmness which was absent in all cases done by the author before making use of the ligaments as this paper describes. One surgeon in examining one of these cases makes a note that the cervix was normal. It is noted also that the vaginal walls more nearly retain their normal position and do not give one the impression that they are falling in from the sides.

CONCLUSIONS

1. That the procedure is logical and simple and adds little to the length of time of complete hysterectomy.

2. That the closure affords a simple method of making the culdesac small in area, shallow in depth, and obliterating it if so desired to cure enterocele.

3. That the ligaments now all oppose each other and the support is as near a maximum as one might expect to attain.

4. That in quite a number of cases the newly constructed support is better than that which remains after a supravaginal hysterectomy where the ligaments have not been disturbed.

5. The undisturbed ligaments may have been attenuated or injured during parturition and should be reconstructed if so found necessary.

6. The procedure is not applicable to prolapse.

FINAL

I wish to take this opportunity to thank Dr. George Gray Ward, Chief Surgeon of the Woman's Hospital, for the interest taken in my efforts and for the use of the records of the hospital; Dr. N. Gilbert Seymour, Medical Director of the Booth Memorial Hospital, for the use of the records of that hospital and a follow-up report on several private patients; and Dr. Reginald M. Rawls, for the kindness in extending to me the privileges of commencing this study while associated with him as his Junior.

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(For discussion, see page 115.)

163 East Sixty-First Street.

THE OCCURRENCE OF CANCER IN THE UTERINE CERVICAL STUMP AFTER SUPRAVAGINAL HYSTERECTOMY

By Louise Branscomb, M.D., Birmingham, Ala.

(From the Howard A. Kelly Hospital)

THE earliest reference in the literature to the occurrence of cancer in the cervical stump is that of Chrobak. Some twenty years later, 1906, Currier observed a case and collected 10 others from the literature. Numerous reports have occurred in the American and European literature of recent years. Among the most important contributions are those of Fleischmann (1925) 50 cases; Sanders (1924) 102 cases; Jeaneney and Chavannaz (1926) 85 cases; and Polak (1921) 256 cases. Polak collected entirely from the American literature. These reports not only cover the question of the occurrence of the disease, but also offer stimulating discussions and suggestions as to methods of preventing the development of cancer in the stump.

The author, during a period of two weeks, observed 6 such cases in the service of the Howard A. Kelly Hospital and found, on reviewing a series of 1804 cases of cervical carcinoma, that 46 belonged to this category.

When the time of development of the cancer after the supravaginal operation is taken into account the 46 cases fall into two groups, 16

occurred within one year and 30 after two years from the time of operation; the longest period was nineteen years and the shortest a few weeks. It is reasonable to believe that in the cases occurring within a year there might have been trouble already developed at the time of the supravaginal hysterectomy. Table I shows the condition for which the operation was done, the time elapsing before the appearance of the cervix cancer, and the microscopic structure of the cancer.

TABLE I

NO.	SUPRAVAGINAL HYSTERECTOMY FOR	INTERVAL BEFORE APPEARANCE OF SYMPTOMS	TYPE OF GROWTH
21749	Nonmalignant condition	19 yr.	Carcinoma
17641	Myomata uteri	15 "	Squamous cell carcinoma
20699	Pelvic inflammatory disease	14 "	" " "
9221	"Tumors on uterus"	13 "	" " "
1309	Myomata uteri	12 "	Adenocarcinoma
19448	Injury due to auto accident	10 "	Carcinoma, mixed type
21429	Myomata uteri	10 "	Squamous cell carcinoma
17726	" "	9 "	" " "
10046	" "	9 "	Carcinoma
14092	" "	8 "	Squamous cell carcinoma
21782	Pelvic inflammatory disease	7 "	" " "
18384	Retroversion and prolapsus	7 "	Carcinoma
2629	Pelvic inflammatory disease	7 "	Squamous cell carcinoma
17478	Myomata uteri	6 "	Adenocarcinoma
19647	" "	5 "	Squamous cell carcinoma
6371	" "	5 "	Carcinoma
15906	" "	5 "	Squamous cell carcinoma
3380	" "	5 "	Sarcoma
2433	" "	5 "	Carcinoma
19214	" "	4 "	Squamous cell carcinoma
12634	Pelvic inflammatory disease	4 "	" " "
4960	Myomata uteri	3½ "	Carcinoma
17133	" "	3 "	Squamous cell carcinoma
2911	" "	3 "	Carcinoma
10552	" "	3 "	Adenocarcinoma
19039	" "	3 "	Squamous cell carcinoma
21491	Pelvic inflammatory disease	2½ "	" " "
19668	" " "	2 "	" " "
6105	Myomata uteri	2 "	Adenocarcinoma
2629	Pelvic inflammatory disease	2 "	No report
21701	Myomata uteri	1 "	Squamous cell carcinoma
20213	" "	1 "	Adenocarcinoma
19431	Nonmalignant condition	1 "	Squamous cell carcinoma
2835	Myomata uteri	1 "	Carcinoma
14684	Myomata uteri	7 mo.	No report
20167	Myomata uteri	7 "	Squamous cell carcinoma
21810	" "	6 "	Carcinoma
16277	" "	3-4 "	Adenocarcinoma
5466	" "	3-4 "	Squamous cell carcinoma
12677	" "	2 "	Carcinoma
18322	" "	2 "	"
6519	" "	2 "	Squamous cell carcinoma
4864	Nonmalignant condition	5 weeks	" " "
20828	Pelvic inflammatory disease	None	Epithelioma, basal cell
13555	Myomata uteri	"	Adenocarcinoma
7959	Myomata uteri, Chr. P.I.D.	"	Squamous cell carcinoma

Among the 30 occurring after two years there is nothing in our records to show a predisposing cause to cancer in the stump except perhaps in instances No. 10522 and No. 6105 which were adenocarcinomas and might have been extensions from adenocarcinomas of the fundus uteri. The average age of the patients under study was forty-nine and three-tenths years, the oldest being sixty-nine and the youngest thirty-four. These figures represent about the average for occurrence of cancers of the cervix.

In all instances the operation had been done for nonmalignant conditions; 33 for myomas, 8 for pelvic inflammatory disease, 1 for prolapse, 3 for causes not ascertainable, and 1 on account of an automobile injury.

It is unlikely that the presence of fibroids of the uterus has any connection with the development of cancer in the cervix, although there is a current impression that the fibroid uterus is more frequently associated with cancer of the cervix than the nonfibroid uterus. In the presence of fibroids and bleeding, the gynecologist is too likely to jump to the conclusion that the fibroids are the cause of the trouble and a cancer is easily overlooked in an early stage. That this is borne out by the cases under consideration is shown by the fact that in the group which occurred in less than a year after the operation, 92 per cent were in association with fibroids, and in the later recurrences only 69 per cent show such an association. Leonard's observations correspond closely to those noted here.

In the total group of 46 there is a record of microscopic examination in all but 2. In 11 of these, in which the diagnosis was reported, of which slides are not now available, there is a diagnosis of carcinoma without statement as to type. In the remaining 33, 24 are squamous, 7 adenocarcinoma, 1 sarcoma, and 1 mixed cell carcinoma.

Thirty-seven of these patients had borne children and might have had trauma of some kind. Nine, married from thirteen to thirty years, had not had children, nor operations on the cervix. The importance of trauma as a cause of these cancers is not established by the cases under consideration.

Most cancers occurring in the cervical stump are best treated by radium but it does not fall within the scope of this paper to discuss the technic and results of such treatment.

Attempts have been made to estimate the frequency of this condition after hysterectomy. Tarnier (1928) in 1164 cases found not a single instance. Albrecht (1928) found 17 in 4218 cases, 0.4 per cent; Sanders (1924) 18 in 2062 cases, 0.8 per cent; Tesaure, 10 in 1864 cases, 0.54 per cent. The records at the Howard A. Kelly Hospital offer no material which throws light on this subject. In none of the 46 under consideration was the original operation done in this hospital.

Polak states that the mortality is about ½ per cent higher from a total hysterectomy than from a subtotal.

Drs. Kelly, Douay, and Bland Sutton have advocated coring the cervix in order to remove the glandular epithelium. Lincoln Davis reports a case where, eighteen months after a supravaginal hysterectomy and a thorough coring with cauterization of the cervix, a cancer developed in the stump.

The practical lesson to be drawn from this study is, first, that a thorough diagnostic exclusion of cancer either in the cervix or the body of the uterus should be made as a preliminary to a supravaginal hysterectomy; and, second, that patients who have had such an operation should be kept under observation and instructed that discharge or bleeding are abnormal conditions and that they should immediately seek medical advice on the first appearance of either of these symptoms.

It is interesting to note that the frequency of occurrence of these cancers is almost identical with the increased risk of a total over a subtotal hysterectomy. It is possible that the cervix might be destroyed with the cautery after a subtotal hysterectomy and the development of cancer prevented; but there is reasonable doubt as to this because we know that old burns on the skin and on other parts of the body are not infrequently the sites of cancer.

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ANEMIA IN PREGNANCY*

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INVESTIGATORS are not entirely agreed on the changes in the blood during gestation, since the reaction of the blood to the stimulus of pregnancy differs so much in various women. Older investigators (Audral and Gavarret, Regnault, Becquerel, and Rodier[1]) considered the condition of the blood in pregnancy as one of chloranemia. Other writers (Schroeder, Carton, Zangemeister) stated that there was an increase in the red blood corpuscles and hemoglobin during the antenatal period.

The present study was undertaken to aid in clarifying the discrepancy of views and to determine the true blood picture of a large number of gravid women. An attempt was also made to ascertain the etiologic factors underlying the changes occurring in the blood.

Three types of anemia in the gravid state have been described. The first, the pernicious type reported by Channing in 1842, and the second, the severe hemolytic anemia, do not come within the scope of this investigation. The third, the so-called "physiologic anemia" of pregnancy, which we are led to believe should be termed "pathologic," forms the basis of this communication.

Since 1927 routine erythrocyte counts and hemoglobin estimations were made on all women registering in the prenatal clinic of the Jefferson Medical College Hospital. These examinations were performed by a qualified technician under the direct supervision of Dr. B. L. Crawford, director of the laboratory. The Thoma hemocytometer with the Leitz counting chamber and Neubauer ruling, was used for cell counting. The Dare hemoglobinometer was used to determine the percentage of hemoglobin. This instrument was standardized by the laboratory at intervals of two weeks, so that it was sufficiently accurate for the purpose of this study.

The normal low level for the erythrocytes and hemoglobin is arbitrarily placed at 3.5 million red cells per c.mm. and 70 per cent hemoglobin, respectively.

The patients were of the free "dispensary type" and were practically equally divided between the black and white races. Erythrocyte counts were taken on 1000 women in the various periods of gestation and on 200 women within forty-eight hours and seven to ten days after delivery.

*Read at a meeting of the Philadelphia Obstetrical Society, January 2, 1930.

The results of the erythrocyte counts and hemoglobin determinations in the different trimesters of pregnancy reveal the following:

1. *Erythrocyte Determination.*—In the entire group of 1000 patients, 474 patients, or 47.4 per cent, gave erythrocyte counts of 3.5 million per c.mm. or less, whereas only 16.1 per cent had an erythrocyte count of 4 million or over.

2. *Erythrocyte Counts According to Trimesters.*—Classification of the erythrocyte counts according to the trimester of pregnancy in which the test was performed, reveals that 121 patients were examined in the first and second trimesters, 722 patients in the third trimester, and 157 patients were examined during labor. Of the 121 patients examined in the first two trimesters, 24.7 per cent gave a count below 3.6 million; 56.7 per cent of the 722 patients examined in the last trimester gave evidence of a similar grade of anemia; and 21.7 per cent of the patients examined during labor showed less than 3.6 million red cells. Thus, it appears that the anemia is most marked in the third trimester with perhaps a slight improvement just before the onset of labor.

3. *Hemoglobin Estimations.*—The hemoglobin estimates of the 1000 patients were distributed as follows: A distinct hemoglobinemia (70 per cent or less) occurred in 586 patients, or 58.6 per cent, while only 129, or 12.9 per cent, of the women gave a hemoglobin percentage above 80.

4. *Erythrocyte Counts in the Puerperium.*—The erythrocyte counts of 200 patients were performed within forty-eight hours after delivery, and again seven to ten days postpartum in order to ascertain the immediate changes consequent upon childbirth. In 94 patients in this group, a count of over 3.5 million had been obtained during pregnancy, while in 106 patients an anemia was manifested equivalent to a count below 3.6 million.

In the former normal group of patients, 11.6 per cent showed an increase of over 200,000 cells within forty-eight hours after delivery, whereas 73.4 per cent showed a blood loss at this period.

In the latter group of patients exhibiting an anemia during gestation, however, 25.5 per cent gave no evidence of a further change within forty-eight hours after delivery; 16 per cent suffered a further reduction of over 200,000 cells per c.mm.; whereas 58.4 per cent showed a distinct gain over 200,000 erythrocytes per c.mm.

5. *Hemoglobin Determinations in the Puerperium.*—In this group of 200 patients a hemoglobinemia of less than 70 per cent had been obtained during pregnancy in 120 patients. Within forty-eight hours after delivery, 45 of this group no longer manifested this reduction. This recovery was even more marked within seven to ten days postpartum when 70 per cent of the patients with a hemoglobinemia during pregnancy now had a normal estimation.

DISCUSSION

The etiology of the anemia of pregnancy remains undisclosed. The withdrawal of iron from the maternal corpuscles by the growing fetus, the maternal blood destruction by a syncytial hemolysin in the ectodermal cells of the chorion as advanced by Hofbauer, the occurrence of a chloranemia, and the relative deficiency due to increase in blood volume are all probable factors in the production of this so-called physiologic anemia of pregnancy.

Experimental work to date indicates that in the latter half of pregnancy there is a definite increase in the blood volume. Kaboth, in 1924 estimated that the total increase in blood volume during preg-

nancy is about 400 c.c., while Gueissaz and Warner estimate the increase to be about 15 per cent.

It is believed that the loss of blood during labor and the withdrawal of the fetal blood are the two important factors responsible for the diminution of red cells after labor.

The data of Keith, Rountree and Geraghty point to the existence of an increased amount of blood and plasma during the latter half of gestation. The mean blood volume for women averaged 85.7 c.c. per kilogram of body weight. This increased in the latter period of pregnancy to 95.6 c.c. for each kilogram of uncorrected body weight. After delivery there was a large decrease in the absolute blood volume which was greater than could be accounted for by the loss at parturition. The average decrease in blood seven to ten days after delivery was 1100 c.c., whereas the average loss of blood at delivery was only 300 c.c., the volume of fetal blood accounting for the remaining 800 c.c. taken from the maternal circulation.

This dilution of the blood might manifest itself in a lowered red cell count. It is difficult to understand, however, how the condition of the blood in pregnancy is greatly influenced by this dilution, since, as pointed out by Galloway, the majority of the cases responded to treatment with iron and arsenic, liver therapy and the ultraviolet ray. The spontaneous recovery occurring in the puerperium would seem to indicate that much of the blood deficiency is primarily due to pregnancy per se and that the anemia did not exist prior to gestation. However, those patients who still manifested a distinct anemia or a progressive anemia after childbirth should be carefully observed until the blood deficiency has been corrected. It is interesting to note that of the 500 or more cases of pernicious anemia of pregnancy reported in the literature, there is no record of any prenatal supervision.

CONCLUSIONS

1. Although the true significance of pregnancy anemia is undetermined, a systematic blood examination is urged in the antenatal period of all patients.

2. Proper therapy should be instituted in all patients with blood counts well below the normal level.

NOTE.—The authors wish to acknowledge their indebtedness to Professor P. B. Bland under whose direction this preliminary report was made possible.

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1731 SPRUCE STREET.
1717 PINE STREET.

(For discussion, see page 123.)

VALUE OF ROUTINE RADIOGRAPHIC EXAMINATIONS OF THE NEWBORN, BASED ON A STUDY OF 702 CONSECUTIVE BABIES*

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RADIOGRAPHIC studies of infants had been of definite value in a considerable number of newborn, and we believed that a routine study of all infants born in a hospital might furnish data which would warrant an expense of about two dollars per infant. With the cooperation of the Hospital Board of Columbia Hospital, this study was started October 26, 1927, and ended December 7, 1929. During this period of study eleven babies who were born alive died in the hospital without having radiographic examinations. Six of these were premature and the others died from conditions such as cerebral hemorrhage (2), general anasarca (1), congenital bowel obstruction (1), and atelectasis (1). Four of the babies who were studied died. The plates on these showed the following findings: (1) Marked hydrocephalus with overdevelopment of frontal sinuses. (2) Marked atelectasis of both upper lobes of the lungs. (3) Extremely large heart and thymic shadow. Some atelectasis of both lungs. This infant was given one x-ray treatment. Autopsy showed a cerebral hemorrhage. (4) Very wide thymic shadow, and the heart shadow appeared larger than normal with some right-sided enlargement. This baby had one x-ray treatment. Congenital heart disease and lobar pneumonia were given as the cause of death.

A total of 702 infants were x-rayed one or more times. The technic was as follows: exposure $\frac{1}{10}$ second, distance 30 inches, 30 M.A., 60 K. V's. Forty-five per cent or 319 infants were normal from the radiographic viewpoint. Fifty-five per cent or 383 infants showed some abnormality on the plate. Enlargement of the thymus gland was the most common finding, some degree being present in 229 infants or 32.6 per cent. An abnormal lung condition was found in 184 infants or 26 per cent. An abnormal appearance of the heart was observed in 108 infants or 15 per cent. A detailed statement of the radiographic findings may be found in Table I.

The criterion of Wasson was used as a basis for the determination of thymic enlargement, that is, if the thymus shadow was twice the width of the second thoracic vertebra, the gland was measured at the

*Read at a meeting of the Chicago Gynecological Society, January 17, 1930.

TABLE I. NEWBORN INFANTS X-RAYED FROM OCTOBER 26, 1927 TO DECEMBER 7, 1929

TOTAL NUMBER OF INFANTS RAYED		702	
CONSIDERED NORMAL		319 or 45%	
TOTAL ABNORMALITIES		NO. OF EACH	PERCENTAGE
Thymus:			
Markedly enlarged		144	
Moderate hypertrophy		85	
	Total	229	32.6
Lungs:			
Pneumothorax		6	
Increased hilus densities and increased peribronchial markings		20	
Increased hilus densities		35	
Poor aëration of lungs		38	
Atelectasis		84	
Interlobar septum between middle and lower lobe		1	
	Total	184	26
Heart:			
Large heart		73	
Long hanging type		1	
Peculiarly shaped heart		1	
Right-sided enlargement		15	
Heart displaced to left		13	
Small heart		1	
Dilatation of heart		4	
	Total	108	15
Miscellaneous:			
Hydrocephalus		2	
Excessive gas in stomach and intestine		7	
Marked widening of suture lines in skull		2	
Rickets		4	
Fractured clavicle		4	
Tenting of diaphragm		1	
Abnormalities of spine		2	
Large liver shadow		1	

second interspace. The findings were dictated by the roentgenologist in the daily routine of radiographic dictation. While a total of 229 newborn showed some degree of thymus enlargement, only 20 or 7.6 per cent of those with hypertrophy had symptoms which led to x-ray treatment. As previously stated two babies who had one treatment each, died and it is doubtful whether the thymus had anything to do with the symptoms. It is possible that the thymus might not have caused the clinical symptoms in some of the other babies, nevertheless, improvement began within a few hours after the first treatment and recovery was complete in each case.

Approximately one-third of the babies studied were delivered by one of us (C. H. D.). An analysis of the records for 200 of these where the mothers had a similar type of prenatal care would seem to indicate that there is no apparent relationship between the size of the thymus and the age, parity, or physical condition of the mother.

TABLE II. TWO HUNDRED CASES WITH SIMILAR PRENATAL CARE* (C.H.D.)

AGE OF MOTHER	NO. BABIES	NORMAL THYMUS	ENLARGED THYMUS
YEARS			
18 to 20	7	4	3
21 " 23	17	10	7
24 " 26	37	19	18
27 " 29	51	35	16
30 " 32	40	29	11
33 " 35	23	13	10
36 " 38	16	7	9
39 " 41	9	8	1
Primiparae	100	65	35
Para ii	58	31	27
Para iii	26	14	12
Para iv	9	9	—
Para v+	7	6 (62.5%)	1 (37.5%)

*Sixty per cent of these were delivered during first half year when tendency to hypertrophy of thymus seems greatest.

If we allow for the fact that 60 per cent of the personal cases were delivered during the first six months of the year when a higher percentage of newborn have hypertrophy of the thymus the percentage with enlarged thymus checks very closely with the entire series.

The 229 babies with hypertrophy of the thymus were charted according to the month of delivery, and it was found that this condition was most common in April and May. While some enlargement was recorded in the records of 123 boys, and 106 girls, it should be noted that 14 of the 20 babies treated were boys. Ten or one-half of all babies treated were born between March 1 and May 31.

TABLE III. THYMUS HYPERTROPHY, MONTH OF BIRTH

JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
15	7	20	26	30	20	20	20	18	23	16	14

TABLE IV. THYMUS CASES TREATED, MONTH OF BIRTH*

JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
2	1	3	5	2	0	1	3	0	3	0	0

*The two babies who died were born in October.

The physiology of the thymus gland is more or less unsolved. Marine in his comprehensive review of status lymphaticus indicates that there is a relationship between the thymus and the thyroid; also between the suprarenals, gonads and thymus; and that the size of the thymus gives no indication of its toxicity. Our observations seem to confirm this last statement.

Table I shows that 144 infants had a markedly enlarged gland and 85 had a moderate hypertrophy. Fourteen of the treated cases including two which died from other causes were in the first group and six in the second.

It is a common observation that symptoms are lessened within a few hours after the first x-ray treatment. Furthermore, complete relief is usually accomplished without an apparent decrease in the size of the gland. In this connection it must be recalled that the early effects of the x-ray would be a tissue edema with some increase in size rather than a decrease. In only a single instance was a definite decrease observed six days after treatment. Other cases have shown a persistent enlargement as long as two years after treatment. These observations lead us to believe that relief of symptoms comes from some change in the physiology of the thymus rather than a variation in its size.

The lung findings are of special interest to the obstetrician. Eighty-four infants showed atelectasis and 38 others poor aëration of the lungs, making a total of 122 or a little over 17 per cent who did not have adequate oxygen intake during the first hours of extrauterine life. This shows the necessity of aspirating fluid and mucus from the respiratory tract. Usually this can be accomplished with a soft ear syringe but a tracheal catheter must be used for the occasional infant who has thick mucus in the trachea. Oxygen should be given only after the mucus has been removed. It will usually clear up the color within a few minutes. Occasionally mucus will continue to bother for several hours. It is interesting that a spontaneous pneumothorax should be found in six or nearly one per cent of this group of newborn.

The variations in the heart shadow show that a considerable number of newborn have hearts which from the radiographic point of view are abnormal. Unfortunately we do not have a comparison between these and the clinical findings.

Among the miscellaneous findings it is interesting to note that only four infants showed evidence of congenital rickets. There was no evidence of congenital syphilis. Four babies had a fracture of the clavicle but no other fractures were observed. Other conditions such as hydrocephalus and spina bifida are obvious without the use of x-ray.

A radiographic study of the newborn furnishes interesting data for comparison with clinical findings but at present the expense does not justify its introduction as a routine test.

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(For discussion, see page 130.)

SPLENOMEGALY WITH HEPATIC CIRRHOSIS (BANTI'S SYNDROME) AS A COMPLICATION OF PREGNANCY, WITH THE REPORT OF A CASE

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THE following case is reported in some detail because of the uncommon association of pregnancy with splenomegaly and cirrhosis of the liver, and because of the fact that a diagnosis of Banti's syndrome was made and splenectomy performed during the second trimester of gestation.

We have been able to locate in the literature only three cases of splenomegaly in pregnancy. Allen[1] reported two cases in 1924. In the first of these splenectomy had been done five years before the beginning of the pregnancy, the removed organ weighing 770 grams. The gestation was normal except for moderately severe gastrointestinal disturbances. Labor began spontaneously one week after the calculated date and was terminated after sixteen hours by low forceps. The adherent placenta was removed manually. While the birth canal was being inspected, "the patient suddenly became cyanotic, took a few gasping respirations, and died on the table." Necropsy was not permitted and no explanation for the sudden death was adduced. The child was in good condition and was discharged alive. The second patient was first seen five weeks after the last menstrual period complaining of a mass in the upper abdomen and an evening rise of temperature. Although an exploratory laparotomy was done, the enlarged spleen was not removed. Two months later a diagnosis of aleucemic leucemia was made and x-ray therapy instituted. The patient went into labor two weeks before the calculated date and after seven and one-half hours was delivered by forceps of a five-pound, eight-ounce baby. Two hours after the normal delivery of the placenta a severe postpartum hemorrhage occurred which was finally controlled by pituitrin and tamponade. The secondary anemia necessitated a prolonged hospitalization, with the patient and her baby being discharged on the thirty-seventh postpartum day.

Six months later when the patient was again six weeks pregnant, a therapeutic abortion and sterilization were performed. The following month the spleen was removed and found to weigh 885 grams. There was no demonstrable lymphadenopathy and the liver was normal at the time of operation.

Birdsong, Hubert, and Whelchel[2] have reported a primipara of thirty-three years who first consulted them because of anemia when four months pregnant. For four years previously the patient had had severe menorrhagia and metrorrhagia, for which roentgen-ray therapy had been employed with some success. During the pregnancy the anemia became progressively worse until just before term the hemoglobin was only 23 per cent, and the red blood cell count 2,300,000. Labor began spontaneously and the delivery of a stillborn child was completed by version and extraction. During the second postpartum week, with the development of alarming symptoms of anemia, transfusions were employed. Unusual bleeding occurred again in the fourth week, along with fever and tachycardia. Since the spleen and liver were somewhat enlarged, a diagnosis of splenic anemia was made. Local applications to the interior of the uterus and roentgen-ray treatments finally

controlled the bleeding and the patient slowly convalesced. Three months after delivery, the red blood count was 3,270,000 and hemoglobin 65 per cent. The color index had been uniformly low, the differential count was never peculiar, and no abnormal cells were discovered. However, an unusual brown pigmentation of the skin seems to have been a prominent figure.

CASE REPORT

N. S., a white, married female, aged forty-two years, was admitted to the Department of Internal Medicine on August 3, 1928, complaining of a constant dragging pain in the lower left abdominal quadrant, of an intermittent enlargement of the abdomen, and of swelling of the ankles on exertion.

The family history was unimportant. The patient had had smallpox (?) at twelve years, influenza in 1918, no operations, and two full-term pregnancies (1918 and 1921), both spontaneous, and both children living.

For the past two years a gradual enlargement of the abdomen has developed. This swelling was intermittent, the abdomen increasing in size for a week at a time and then gradually receding. Since the spring of 1928, the abdomen grew constantly larger, although there was still considerable variation from day to day. Occasional dragging pains and sometimes a sharp pain in the left lower quadrant, especially on exertion, were observed. When the pain appeared it frequently persisted for twenty-four hours. For the past four weeks there was some edema of the ankles in the afternoons and evenings which disappeared on lying down. There was no general weakness or shortness of breath. A slight gain in weight was associated with good appetite and regular bowel evacuations.

Since April, 1928, the menstrual periods were irregular and very scant. The last period occurred on July 5, when there was only a stain of blood. For the past six to eight weeks a profuse leucorrheal discharge was present.

Physical Examination.—The pulse was 88 per minute, and the blood pressure 140/60. The general examination was negative. A hard, smooth, symmetrical mass was present in the left upper abdomen, reaching to the umbilicus and medially to the midline, but not moving with respiration. In the middle of the lower abdomen there was another softer mass reaching out of the pelvis to two fingers above the symphysis. Pelvic examination (August 6) revealed a three months' uterine pregnancy with the adnexal regions clear. Cystoscopic examination and pyelograms (August 8) showed a moderate hydronephrosis and hydroureter on the right side but no demonstrable change in the left kidney. A colon x-ray series (August 13) was reported as showing: "Evidence of a mass on the left side of the abdomen with definite evidence of colitis of the descending and sigmoid colon, and angulations and redundancy of the descending colon." The urine (August 4) was normal. Blood study (August 4) showed hemoglobin, 65 per cent, R.B.C. 3,200,000, and W.B.C. 6,050, with 84 per cent polymorphonuclears and 16 per cent lymphocytes. Repeated blood counts gave similar results. Blood Wassermann reaction was negative. A special blood study showed:

Venous blood clotting time (capillary tube), 6 min.
Venous blood clotting time (Brodie-Russell), 8 min.
Capillary blood clotting time (capillary tube), 3½ min.
Capillary blood clotting time (Brodie-Russell), 4½ min.
Prothrombin time, 5.0, 6.0, 8.0, and 8.0 min.
Fragility of R.B.C. Began at 0.38 per cent and was complete at 0.30 per cent.
Blood platelets, 1.4 per cent.
Hematocrit, 28 per cent.

There was an afternoon rise of temperature from 99.0° F. to 99.6° F. with a pulse range of 70 to 96.

On August 24 the patient was transferred to the Department of Surgery with a diagnosis of splenomegaly, and on the following day splenectomy was performed through a right rectus incision. There was only a small amount of clear fluid in the peritoneal cavity. In several places the omentum was attached to the anterior abdominal wall by well-established adhesions. The liver, which extended halfway from the costal margin to the umbilicus, was cirrhotic and hob-nailed in appearance, but no malignant nodules were made out. The right lobe was about one-half normal size, while the left lobe was enlarged. The spleen, which was of a pale gray color and moderately firm, was removed without great difficulty after ligation of its vessels. There was little blood lost and the patient stood the intervention well.

Pathologic Report.—The spleen measured 19 x 10 x 6 cm. and weighed 600 grams. "The capsule is somewhat thickened. The malpighian corpuscles are not distinct, appearing atrophied and scarred. There is a considerable increase in the interstitial tissue in the pulp, and the vascular spaces are seen as small round vessels surrounded by fibrous tissue. Many polymorphonuclear and endothelial cells are found in the pulp. Phagocytosis of the red blood cells is quite prominent. Nucleated red cells are numerous. There is definite evidence of chronic irritation and the picture is not due entirely to chronic passive congestion. The picture is similar to that dscribed in Banti's Disease.

"Diagnosis: Splenomegaly; fibrosis of the spleen; phagocytosis of red blood cells."

Convalescence was uninterrupted and on September 10, the patient was returned to the Medical Department feeling much better than before operation. The former abdominal pain and discomfort were gone, although the abdomen was still somewhat distended. Blood pressure of 120/50 and pulse of 96 were mean averages. The weight before operation was 113 pounds; after operation, 108 pounds.

On September 11, blood studies revealed hemoglobin 65 per cent, R.B.C., 4,000,000, and W.B.C., 13,300, with 78 per cent polymorphonuclear cells and 22 per cent lymphocytes. The second special blood study showed:

Coagulation time venous (capillary tube) 3 min.
Coagulation time venous (Brodie-Russell) 3½ min.
Coagulation time capillary (capillary tube) 2½ min.
Coagulation time capillary (Brodie-Russell) 3 min.
Bleeding time 50 seconds.
Prothrombin time 8.0, 8.5, and 9.0 min.
Clot retractility 1 hour.
Fragility 0.42 per cent to 0.36 per cent.
Arm band test negative.
Platelets 1 per cent.
Reticulocytes (8 in 500 cells) 1.5 per cent.

Since the temperature was not elevated and the pregnancy was proceeding normally, the patient was discharged Sept. 17, 1928, to return for delivery.

The patient was readmitted on November 26, to the Department of Obstetrics and Gynecology with complaints of shortness of breath and swelling of the ankles. The blood pressure was 150/75, but the urine was negative for albumin and casts. The plasma fibrin content was 0.46 per cent. The blood count showed hemoglobin (Dare), 55 per cent, R.B.C., 2,800,000, and W.B.C., 14,200, with 76 per cent polymorphonuclears, and 23 per cent lymphocytes. The weight was 129¾ pounds, a gain of 21¾ pounds in ten weeks. It seemed that some ascites was present, although the presence of the pregnant uterus interfered with its determination.

The patient was kept in bed on a restricted diet with the evident edema rapidly subsiding, but with the ascites increasing very rapidly, so that there was a gain of weight amounting to 16 pounds in the next three weeks, with a loss of 5½ pounds just before delivery. No signs of toxemia developed, although the blood pressure remained somewhat elevated.

Spontaneous premature labor ensued on December 28, when, after a three and one-fourth hours' labor, a child weighing 2200 grams was born spontaneously. (The child did well on formula feeding and was discharged with the mother; weighing 2970 gm.) The blood loss at delivery was 250 c.c.

After delivery there was a slight intermittent temperature for two weeks with a high point of 101° F. on the third day. The urine output was diminished and diuretics had no appreciable effect. An ascites developed rapidly, with an increase in body girth at the umbilicus of 4 inches in seven days. Paracentesis was performed on January 8, when seven liters of clear straw-colored fluid were removed, which contained a heavy trace of albumin and showed 30 cells per c.mm. Following the paracentesis, the edge of the liver became palpable just above the umbilicus. The output of urine rose immediately, and the patient lost weight rapidly. The abdominal girth was reduced from 42 inches to 39 inches by the tapping, and during the next sixteen days receded to 32½ inches with the complete disappearance of ascites. The patient was discharged on January 29 in excellent condition.

Follow-up examination on June 6, 1929 showed the liver edge 13 cm. below the costal margin. No free fluid could be demonstrated in the peritoneal cavity. There were no complaints referable to the abdomen. The blood pressure was 130/70.

No certain explanation can be offered for the complete disappearance of the ascitic fluid, although probably the attachment of the omentum to the anterior abdominal wall facilitated the establishment of a collateral circulation, which became adequate only after the decrease of the abdominal pressure by paracentesis.

The view that liver insufficiency frequently develops during pregnancy and that the toxemias of late pregnancy are due primarily to this insufficiency is hardly compatible with the nontoxic course of this gestation. Even with rather severe damage to the liver, this patient was able to carry a pregnancy for nine lunar months without the development of any symptoms of late toxemia (the slight hypertension can be explained on other grounds in the absence of other signs or symptoms of toxemia) although ascites was a prominent symptom of the latter part of gestation. Moreover, there was no evidence six months after parturition that pregnancy had aggravated the liver disease.

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HEMANGIOMA OF THE PELVIC CONNECTIVE TISSUE

By Robert T. Frank, M.A., M.D., F.A.C.S., New York, N. Y.
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NO CASE of hemangioma of the pelvic connective tissue is recorded in the literature. Reder,[1] Siegel, Delaval and Marie,[2] and Wright[3] report hemangiomas of the uterus. Wright's case possibly could be interpreted as arising from the cellular tissue rather than from the uterine wall.

The unique case herewith reported consisted of an enormous subperitoneal cavernous hemangioma. Six years previously, as the history will show, a similar but smaller and more localized mass was removed from the left broad ligament, together with the ovary and tube. The full clinical significance of the case will have to be left subjudice until further time has elapsed after the last operation, performed two years ago.

P. H., thirty-five years of age, unmarried, admitted to the Mt. Sinai Hospital Feb. 16, 1926, discharged March 13, 1926. Complained of abdominal pain of four weeks' duration. Last menstruation Jan. 20, 1926.

Six years ago the patient was operated upon at another hospital. A laparotomy was done, the report of which was only obtained some time after the patient was operated upon at Mt. Sinai Hospital. After this operation the patient felt well until quite recently.

For the last six weeks patient has noticed an enlargement of the lower abdomen. Four days before admission there was a feeling of distension and gurgling with cramp-like pains in the hypogastrium and lower back. There had been constipation and frequent and burning urination. During the last eighteen months the patient lost 20 pounds.

The patient's general condition was good. She was well nourished.

Abdominal examination showed a mass arising from within the pelvis and reaching on the right side to the level of the umbilicus. This mass appeared continuous with the uterus. A smaller mass was felt on the left side just reaching the pelvic brim. The cervix was found fixed high up, the pelvis being filled from brim to brim, the mass on the right appearing about the size of a melon, on the left side a smaller mass was noted not descending as deeply into the pelvis. White blood count was 13,000, polynuclears 76 per cent, mononuclears 4 per cent, lymphocytes 20 per cent; blood sedimentation time one hour and forty-three minutes; blood pressure 142/80; hemoglobin 55 per cent. The diagnosis of intraligamentous cysts or less likely, a chronic stage of pelvic inflammatory disease (tuboovarian) was made.

Operation: Median subumbilical incision exposed a bluish red, polycystic edematous mass rising to the level of the umbilicus. After packing back the nonadherent intestine, by blunt separation the fundus of the uterus was exposed. From the right horn of the uterus the right tube could be traced outward and backward, and a perfectly normal looking ovary was likewise found, both of these organs riding on top of the tumor mass. The left side of the pelvis showed the absence

of the tube and ovary. The bladder was found much elongated, almost tubular in shape and, separating it from the uterus, was neoplastic tissue similar to the rest. The sigmoid colon disappeared into the pelvis behind the mass which adhered closely to the bowel (Fig. 1). The prospect of removing this neoplastic conglomeration seemed poor but an attempt was made nevertheless. Although bright blood was obtained when the "cysts" were punctured, the diagnosis of "hemangioma" was not arrived at, perhaps fortunately for the patient, because I believe that I would hardly have had the temerity to attempt its removal if I had recognized the direct connection of the growth with the vascular system.

In order to make progress, numerous "cysts" were torn and punctured and, as opened, compressed with large pieces of gauze in order to gain room and control the hemorrhage. By this method, as if squeezing out and compressing a sponge, the infundibulo-pelvic ligament on the right side was reached. Starting from there, by means of the technic associated with Kelly's name, the pelvis was cleared, going from right to left, cutting across the cervix of the uterus when this was reached, and with a great deal of difficulty, shelling the distorted and friable

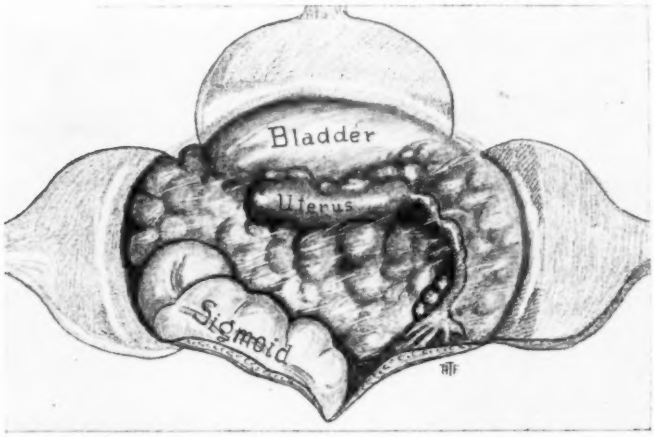

Fig. 1.—Hemangioma of pelvis. Subperitoneal tumor, showing normal right adnexa. The left adnexa were removed at a previous operation.

bladder from the growth. Although innumerable blood vessels had to be tied, no large nutrient vessels entering the cystic masses were encountered. The entire mass was subperitoneal, except anteriorly where it had apparently broken through the anterior culdesac and loosely attached itself to the posterior surface of the bladder and the anterior surface of the uterus by innumerable, delicate connective tissue fibrils, without, however, penetrating into the substance of either of these viscera. Owing to the previous operation, the only anatomical structures definitely identified were the right infundibulo-pelvic ligament and the right and left uterine arteries. After the pelvis was cleared the pelvic cellular tissue, almost down to the perineum was plainly in view, apparently entirely freed of neoplasm. Subperitoneal drainage was instituted through the cervical stump and the wound entirely extraperitonealized by utilizing the bladder peritoneum and sigmoid.

Convalescence was uneventful.

Macroscopically, the removed tumor was completely collapsed, spongy tissue, occupying less than ⅕ of the original mass, hanging like streamers from the sole loose attachment left, namely the posterior surface of the uterus.

Microscopically, as can be seen from Fig. 3, the tumor tissue consisted of a

simple cavernous hemangioma the septa consisting of very loose, soft, edematous fibrillar connective tissue. In no area were malignant changes to be found nor did proliferation of the vessel endothelium occur. The diagnosis of hemangioma was therefore made.

This tumor mass showed no intimate relations with either the uterus, the adnexa, the intestines, or bladder. Its point of origin, therefore, must have been the pelvic cellular tissue.

Subsequent to the operation, a report was received from Dr. F. B. Olintine of St. Anthony of Padua Hospital, Chicago, Illinois, in which the pathologic report of the tumor of the broad ligament removed six years previously was given. "A bloody, stringy, fleshy mass, the size of a large grapefruit was removed from the left broad ligament. It consisted of a mass of immature connective tissue with numerous interlacing capillary spaces filled with blood."

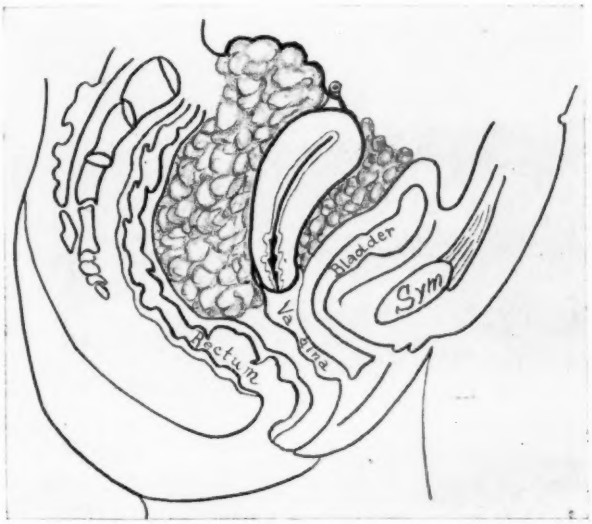

Fig. 2—Schematic sagittal section showing relation of growth to the rectum, uterus and bladder.

This agrees exactly with our findings except that the then diagnosis of "fibroma of the broad ligament" was, in my opinion, erroneously made.

In spite of the fact that this tumor recurred after an interval of six years, I do not consider the neoplasm truly malignant but believe that the recurrence originated from portions of the mass left behind.

Exactly two years after this patient had undergone her second operation, reoperation was performed because of recurrence in the left side of the pelvis.

Relaparotomy (Feb. 14, 1928) exposed a tumor identical with the previous ones. The mass was entirely retroperitoneal but had grown above the bladder. In separating the bladder from the growth, this viscus was torn into. The bladder wound was now enlarged and with fingers in the bladder and the fingers of the other hand in the vagina, it could be determined that operation was impossible because of the wide extent and diffuse distribution of the mass. The bladder injury and incision was therefore repaired and the abdomen closed. Convalescence was uneventful.

On Feb. 29, 1928 radium was applied per vaginam and over the abdomen and buttocks. In all, 19,250 mg.hr. were given.

Two years have elapsed. The patient is in good health. The mass, which filled the entire left side of the pelvis is now firm, hard, and no larger than a small orange.

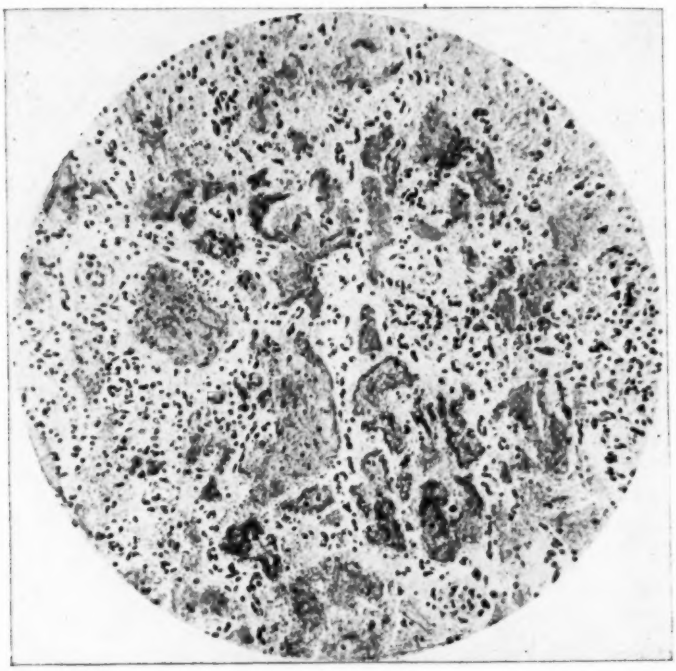

Fig. 3—Photomicrograph, low power. Cavernous sinuses filled with blood are bounded by thin-walled septa consisting of loose embroyonal connective tissue.

This rare mesenchymal tumor in distribution and clinical course resembles a retroperitoneal lipoma, which likewise has the tendency to recur.

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MENSTRUAL PERIODS INDUCED IN OVARIECTOMIZED MONKEYS BY ESTRUS-PRODUCING OVARIAN HORMONE

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IN EXPERIMENTS previously reported,[1, 2] it has been demonstrated that active extracts of ovaries and placenta will substitute for the endocrine function of the ovaries to the extent of producing full estrous growth in ovariectomized laboratory animals and experimental menstrual cycles in ovariectomized monkeys. These experimental cycles in ovariectomized monkeys are similar to the nonovulating type of menstrual cycle in normal monkeys (Corner[3]) in that the uterine glands fail to develop beyond the interval condition. The interval hyperplasia of the epithelium of the whole genital tract and mammary glands and the secretion of glycogen by the glands of the uterus, the premenstrual edema, and the menstrual hemorrhage of the endometrium are typical menstrual phenomena. The hyperplasia of the genital epithelium and the secretion of the uterine glands definitely result from action of this hormone. The edema and menstrual hemorrhage follow several days after cessation of hormone administration. Therefore this hormone alone is sufficient to induce menstruation experimentally.

Corner and W. Allen[4] and Hisaw and Leonard[5] have shown that specific extracts of corpus luteum ("progestin") following administration of the follicular or estrus-producing hormone will carry development of the uterine glands of the rabbit to a progestational development and those of the monkey to a full premenstrual condition. Allen, Pratt, Newell and Bland[6] have demonstrated that there is considerable follicular hormone in corpora lutea at the same time that this specific factor described by Corner and Allen and by Hisaw and Leonard is operating. Just how these two active principles are balanced is only partly understood but Hisaw's work suggests a rather delicate quantitative balance.

The experiments described below concern results obtained in two ovariectomized monkeys from hormone administered by the vaginal route. The subcutaneous injection method of administering ovarian hormone when used at brief intervals over considerable periods of time becomes objectionable to patients. It has previously been shown that oral administration is very inefficient in that 20 or more times the minimal dose when given by injection is required by mouth for a positive reaction (Loewe, Lange and Faure[7]). This hormone is read-

ily absorbed from the peritoneal and uterine cavities (Allen[8]). Recently Pratt and Smeltzer[9] have demonstrated effective absorption of hormone dropped into the conjunctival sac and sprayed upon the mucous membrane of the nasal cavities. Powers, Varley and Morrell[10] have reported effective absorption through the walls of the vagina of the monkey, the hormone being administered in the form of gelatin pessaries. The following is a brief report of two experiments tried in our laboratory with similar preparations of this hormone ("Amniotin," Squibb).

The ovaries were removed from two adult monkeys of 42 and 45 kilograms body weight and then considerable periods of castrate atrophy allowed to elapse. During this time the red color of the "sexual skin" faded. Then the hormone was administered by inserting gelatin pessaries into the vagina twice daily for twenty-four days. Dosage began with 10 rat units per day, was increased gradually to 80 units by the fifteenth day and maintained at this level until the end of the experiments. A total of more than 1160 rat units of hormone per monkey was distributed through twenty-four days.

By the fifth day of injections the "sexual skin" had reddened considerably and this color deepened as the injections were continued until a maximum reddening had been induced by the end of the second week of injections. After hormone administration was stopped nothing happened for six days except a slight fading of the color of the "sexual skin." On the morning of the sixth day after stopping hormone administration both animals began menstruating. These experimental menses were quite prolonged, lasting in the first monkey for nine days and in the second for seven days, or nearly twice the length of the usual period. Bleeding was more profuse than during normal menses. Toward the end of these experimental menses the amount of flow decreased but considerable numbers of red blood cells could be identified in vaginal smears. The latent period of six days between discontinuance of hormone administration and the onset of the experimental menses is nearly twice as long as the average of previous experiments. The flow was much more profuse.

From the above facts we are inclined to consider the administration of this hormone by the vaginal pessary method more effective than by subcutaneous injections of water preparations.

During the course of hormone administration overnight samples of urine were collected, extracted for excreted hormone and the extracts tested by injections into spayed rats. It was found that when 80 rat units of hormone per day were being administered that at least 4 rat units (possibly greater amounts) could be recovered in overnight samples of urine. It is probable that lighter doses of hormone as described by Powers, Varley and Morrell, would have proved effective.

We were, however, interested in inducing maximum conditions rather than in establishing a minimal effective dose.

SUMMARY

Two ovariectomized adult monkeys were given twenty-four days' continuous treatment with estrus-producing, ovarian hormone. This active substance ("Amniotin," Squibb) was administered by gelatin pessaries inserted into the vagina twice daily. The total dose exceeded 1160 rat units per animal. Maximum coloring of the "sexual skin" was induced.

A "latent" period of six days followed cessation of hormone administration. Menses began in both monkeys on the sixth day after the last dose. Duration of menses was nine days in one animal and seven in the other or nearly twice the usual period. The flow was more profuse than noted in normal monkeys or during experimental menses previously induced by hormone injections in ovariectomized monkeys.

During hormone administration it was possible to recover some of the active material excreted in the urine.

It would seem that administration of hormone in gelatin pessaries by the vaginal route is more effective than subcutaneous injections of water preparations. Surely it should prove less objectional to patients.

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Eclampsia is always severe, although variable in severity, symptoms and clinical findings and is associated with extremely high fetal and maternal mortality. Seventy per cent of the deaths in the first pregnancy are due to eclampsia. Anemia and oral sepsis are frequently found. When eclampsia recurs the fetal and maternal prognosis is definitely worse. In albuminuria there is a similar but less likely danger to that of eclampsia recurring.

Three weeks of hospitalization following delivery is strongly urged with repeated clinical and laboratory procedures. Succeeding pregnancies are entitled to the strictest observation and management. About twenty per cent of the pregnancies occurring after eclampsia have some degree of toxemia, while almost fifty per cent of the repeat pregnancies after albuminuria develop toxemia. The earlier the occurrence and the longer the duration, the more likely the residual lesion in the kidney.

H. C. HESSELTINE.

AXIAL ROTATION OF THE PREGNANT UTERUS

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(From the United Israel Zion Hospital)

THE anatomically normal uterus, whether pregnant or not, is rotated around its long axis from right to left, so that the transverse diameter between the two cornuas is not parallel to the transverse diameter of the pelvis but the right cornua is slightly closer to the anterior abdominal wall than the left one. This physiologic torsion is very slight in the uterus of normal size and shape, but becomes more pronounced and more easily recognizable in the pregnant organ, although it never exceeds more than a few degrees.

The normal sized and shaped nonpregnant uterus cannot turn around its long axis beyond the physiologic degree, but the tumorous and the pregnant uterus can twist itself to a measure whereby the ratio is no longer commensurate with the normal mobility of the organ.

Küstner believes that an abnormal torsion of the uterus in the early stage of pregnancy is not exceptional. It either corrects itself as the organ grows out of the small pelvis or induces an abortion just as an incarcerated retroflexed, retroverted uterus would do. This twist of the pregnant uterus in early gestation, he denominates as "torsion of the uterus" distinguishing it from those very rare cases which may occur in the latter half of pregnancy and which he prefers to call more appropriately "axial rotation of the uterus."

In this paper we shall adhere strictly to the foregoing terms believing that this will obviate confusion. Hitherto in the literature no distinction has been made between torsion and rotation but both have been used indiscriminately.

Torsion of the uterus is a peculiar condition, inasmuch as the uterus is not only twisted on its long axis, but this axis is also declined from the upper right to the lower left side of the pelvis. In such cases, on bimanual palpation the cervix is felt pointing to the left and the fundus lies in the right hemisphere of the pelvis. Sometimes the upper part of the elongated cervix might be mistaken for the uterus proper and the mass to the right considered to be a tubal pregnancy. Olshausen declines the diagnosis of "torsion" for these cases and assumes that they are rather a lateral flexion. Küstner takes the stand, and we believe rightly, that the gravid uterus hardly can become flexed on its side. However neither opinion has been as yet confirmed by direct visualization.

A much more serious condition is the axial rotation of the uterus. The degree of rotation is sometimes as much as 180 degrees or more. It most often occurs in association with uterine and adnexal growths in nonpregnant uteri but is of exceedingly rare occurrence in the second half of pregnancy. In the survey of the literature for axial rotation in pregnant uteri we found only ten cases, one each by Kiparsky, Stork, Kohler, Glinski, Olow, Calman, Schindler, Vogt and two by Weinzierl. We desire herewith to present the eleventh case:

Of these cases, anatomical abnormalities were found in three, i.e., in Kiparsky's, Calman's and Schindler's case the rotation occurred in the pregnant horn of a uterus duplex unicollis. In Stork's and Vogt's cases anamnestic data were obtained as to an operative procedure previous to the pregnancy in which the rotation occurred. In the latter, a plastic operation was done for the correction of a cystocele, in the former two operations were performed, one for an ovarian cyst adenocarcinoma and a second for the freeing of adhesions. In one of Weinzierl's cases, a sinistroscoliosis of the dorsal verterbral column was present. In the other five cases, no gross anatomical changes were found.

As to the factors and mechanism which bring about the rotation, several theories have been advanced, the variety of opinions depending either on the concomitant incidents or in the absence of these, the explanation becomes purely speculative.

For the sake of clarity it seems practical to us to divide the question and ask first, what are the structural potentialities, if any, that will make for a predisposition and second, what dynamic momentum is in play that actually twists the uterus around?

In the three cases of uterus duplex unicollis, the potentiality of rotation was considered to originate in the same factors that commonly bring about the torsion of ovarian cysts. From a morphologic point of view the similarity is striking, inasmuch as in both conditions we are dealing with a pedunculated spherical organ. Also in certain ruminants as in cows, sheep, goats, and, as an exception, sometimes in horses, veterinarians report the occurrence of axial rotation. These animals possess a duplex uterus and usually only one horn is pregnant. The predisposition for rotation in these uteri is that they possess mesometrium on one side only, therefore endowing them with unusual mobility.

Stork and Vogt believe that the operations performed some time previous have brought about some unusual fixation of the uterus and Weinzierl in one of his cases bases the potentiality of the rotation on the sinistroscoliosis of the mother's spinal column, a condition which always changes the topographical relation between the abdominal organs.

Of more interest than the anatomical abnormalities is the question as to the rotating momentum. Here too we find a great diversity of opinion which would present itself even if the structural and formal conditions were identical in all cases of axial rotation of the uterus.

Sellheim, in a most exhaustive study, discusses the rotating momentum of internal organs, especially of ovarian cysts, and reaches the conclusion that it is a rotating motion of the bearer's trunk which is transmitted to the organ and causes it to become twisted in the same direction that the body has turned. This is borne out in several cases of ovarian cysts where the torsion of the pedicle occurred while daneing or in the case of mowing with a scythe. Sellheim proved his theory very conclusively in experiments. He was able to bring about the torsion of ovarian cysts by the patient's execution of certain swaying motions of the trunk. In Kiparsky's, Calman's and Olow's cases the transmission of the rotating momentum from body to organ is well established because the onset of symptoms was sudden and followed immediately upon some physical exertion, which when analyzed had the essential characteristics of a swift turn. In the majority of axial rotations, however, no such factor can be called in account.

Under the influence of the preliminary labor pains in the last weeks of pregnancy, the uterus rotates slightly in order to adjust its most flexible parts to the curve of the birth canal and according to Stork and Kohler, if a primary insufficiency of the myometrium and an unqualified tonus of the musculature exist, the lower uterine segment will not be able to resist the rotation of the fetus but will be carried along with it and secondarily the rest of the uterine body will be carried around also. That these preliminary contractions of the uterus might play an important part in the development of axial rotation is substantiated by the fact that in a few cases the condition did not come about as acutely as in those in which a sudden motion of the body was accounted for as the cause, but ten or twelve days prior to the aggravation of symptoms, pronounced and intermittent labor pains were present.

A very interesting though hardly acceptable explanation is Payr's hemodynamic hypothesis. According to this theory the engorged veins of an organ as they become more and more tortuous, wind themselves around the arteries and thus secondarily twist the surrounding structures with them. This interpretation will fit organs of delicate structure and weight, as in the torsion of the fallopian tubes but doubt may be entertained whether the force behind such tortuous veins even with an increased pressure within them is sufficient to rotate the pregnant uterus.

Kiparsky considers a relaxed and pendulous abdomen and a sudden one-sided contraction of the abdominal wall to be the reason for the rotation. But this cannot gain general acceptance because rotations were observed in patients who did not suffer from such a condition. Kittel is of the opinion that the changing fullness of the bladder with the peristalsis of intestines may cause the twist of an internal organ and Küstner is inclined to accept the influence of an uneven weight

distribution brought about within the organ by postural changes, as a cause for rotation.

Likewise, an exaggerated physiologic rotation was thought of as the twisting impulse (Glinsky) but this may be rejected by reason that two of the eleven cases showed a rotation from left to right, i.e., against the direction of physiologic rotation. Weinzierl in one of his cases believes that an attempt to bimanually rotate a deep transverse arrested occiput was the factor.

In our own case no anatomical abnormalities were revealed as a possible predisposition to a rotation, nor did the patient disclose any incident which we could interpret as being a contributing factor. However, we believe that the underlying cause which will allow the rotation of the uterus on its long axis is essentially in its loose attachment of its suspending apparatus to the bony pelvis. It seems improbable that the broad and round ligaments could give way to the rotating force at the time that the twist occurs would they not be elongated prior to the actual occurrence. Just as volvulus of the intestines is made possible by a long mesentery with a narrow attachment, in axial rotation an unusual amount of independence is rendered to the uterus by an abnormal length of the broad and round ligaments. It is possible too that an elongated cervix is an additional agent. The uterosacral and vesicouterine ligaments, being attached to the cervix, do not have to give so extensively during the stretching as the other ligaments, especially inasmuch as the rotation pivot is usually in the cervix or in the cervicovaginal junction.

The preoperative diagnosis has never been made, but the condition has been found as a unique surprise either at operation or at autopsy. The symptoms develop during or before labor and they are: intermittent abdominal pain either antecedent to an abdominal shock or concurrent with the collapse, peritoneal irritation, internal hemorrhage, vomiting, etc.; in other words, the signs of acute strangulation of adnexal tumors, uterine rupture, ablatio of the placenta, or ruptured ectopic. A vaginal examination meets an obstruction so that the presenting part cannot be reached.

Of the eleven reported cases, two were diagnosed at autopsy in which retroplacental hemorrhages were in evidence as responsible for the fatality. In the other nine, various diagnoses indicated the necessity of transabdominal operative deliveries and classical cesarean section, Porro or semi-Porro operations were performed. Stork placed the uterine incision on the posterior surface of the uterus as it was in situ anteriorly, similar to our own case.

In three of the cases, including ours, the child was in a transverse position, in two cases the occiput was arrested in a posterior position and in the others no mention was made as to the position and presentation of the child.

CASE REPORT

Mrs. A. D., aged thirty-eight, Italian, nullipara. Estimated date of confinement March 10. At her first visit to the prenatal clinic on January 7, a peculiar contour of the abdomen suggested the possibility of a monster or twins with hydramnios. An x-ray picture at this time revealed a single fetus lying in the transverse position with the head in the right iliac fossa. Otherwise the general examination was negative, the pelvic measurements were found ample, blood pressure and urine normal.

She was advised to return to the clinic on the following day, in order that an attempt might be made to correct the malposition by external version. She failed to do so however, and was lost sight of until her admission to the Israel Zion Hospital on March the first in active labor, having mild pains every five to ten minutes. Onset of labor four hours previous to the admission.

Abdominal palpation revealed the fetus still lying in a transverse position. Rectal examination showed the cervix to be one finger dilated and very thick; unable to reach presenting part; membranes intact.

An external version was attempted under anesthesia but was unsuccessful owing to the fact that we were unable to mobilize the baby or even dislodge the head from the right iliac fossa. Following this procedure the patient was put to bed and the labor allowed to continue. During a period of four hours the pains were weak and ineffectual, the fetal heart sounds were regular and of good quality. Following this, however, immediate delivery by the abdominal route was deemed imperative in view of the fact that the labor pains were increasing in intensity and frequency with almost no period of relaxation between them. The entire uterus appeared spastic and the lower segment was particularly tense, the cervix was rigid and approximately 2 cm. dilated.

Under spinal anesthesia the abdomen was entered by a low midline incision extending from below the umbilicus to the pubis. Upon exposure, very much to our surprise the uterus was found to present its posterior surface anteriorly as the result of an axial rotation of approximately 160 degrees. A striking feature was the tremendous varicosities of the vessels coursing along the lateral margins of the uterus, particularly those of the lower segment. The right horn of the uterus was rotated to the left side of the abdomen, and the right adnexa tremendously engorged and edematous, the tube suspended like a tense sling across the presenting surface of the organ. The left adnexa were not visible. It was found impossible to rotate the uterus back to the normal position without eventration, owing to the fact that it had wedged itself firmly into this acquired anomalous position. It was therefore deemed advisable to enter the uterus in situ through a vertical incision on the posterior surface. The fetus was extracted without any difficulty and the placenta allowed to separate normally before removal. The uterine incision was closed with interrupted chromic No. 2 sutures. The empty and contracted uterus was now rotated back to its normal position and at this time it was extremely interesting to note the rapidity with which the dilated varicose vessels collapsed and assumed a normal appearance. The abdomen was closed in the usual fashion and the patient made an uneventful recovery.

In conclusion we deem worthy of particular emphasis the fact that at no time did the patient have any subjective symptoms which would have indicated the presence of this unusual complication and that furthermore in the prenatal history there is no incident which might be interpreted as a potent factor in the causation of this axial rotation, nor were any developmental defects of the uterus found at operation which might explain the occurrence.

We are also certain that our attempt to correct the transverse position was not responsible for the subsequent findings, because during this maneuver the child's

head never left the right iliac fossa. It would be illogical to infer that during this attempted version the uterus alone was twisted leaving the child in its original position.

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TRICHOMONAS VAGINALIS*

By H. Dawson Furniss, M.D., F.A.C.S., New York, N. Y.

ALTHOUGH the Trichomonas vaginalis was described by Donné in 1834, only scant mention of it as a pathogenic organism was entertained until recent years when it was brought to our attention through the works of DeLee, Greenhill, and Carl Henry Davis.

The importance of it was first suggested to me by Dr. Frederick Holden in May of last year. It was my good fortune to find the Trichomonas in my first search. While this report concerns itself with only 35 cases, I have had many more.

Aside from gonorrhea, I believe that most of the leucorrheas seen are due to this organism, especially where the discharge is due to inflammation of the vagina. Only rarely has the organism been found in the cervix, as the alkaline secretion is inimical to its life.

Williamson (J. A. M. A., Feb. 16, 1929) found the Trichomonas in 1.91 per cent of 1,148 food handlers of Chicago.

In the *Journal of Parasitology* **14**: 261, June, 1928, Hagner reports cultivating the Trichomonads from the intestinal tract of the monkey (rhesus macasus) on serum-saline-citrate media, and injecting them into the vaginas of 6 monkeys of the same species in which 6 examinations upon each had proved negative for Trichomonads. In all the Trichomonads lived for two days, and in 2 a persistent infection was produced. Cultures upon these 2 monkeys on the same media were injected into the vaginas of the 4 monkeys which had failed to develop an infection, and in 2 of these a Trichomonas infection developed. In these specie of monkey the Trichomonas is often found in the vagina, and Hagner is of the opinion that the intestinal and vaginal protozoan are the same, as he has been unable to determine any morphologic difference between them.

*Read at a meeting of the New York Obstetrical Society, February 11, 1930.

There were 35 cases in the series on which this analysis was made. They were evenly distributed from twenty-three to sixty years of age; two of them were twelve and fourteen years old when the trouble was first noted. As far as I can determine, age is not significant. I am sure it will be found that many of the cases that we have called senile vaginitis will prove to be due to the Trichomonas. There were 24 married and 11 single, three of whom were undoubtedly virgins.

The history indicated that 6 started during pregnancy, 3 of whom were pregnant when the Trichomonas was discovered.

Three were known, definitely, to have had gonorrhea, and one had the double infection at the time of the first examination. One had been treated for five years, and another for eleven before the true nature of the trouble was discovered. One who had been pronounced cured of the gonorrhea returned after two months with a profuse discharge, with numerous Trichomonas and no gonococci. Two were accused by their husbands of causing an urethral irritation. In one of these neither the gonococcus nor the Trichomonas were found; however, several days had elapsed before the trichomona was looked for. I do not know what was found in the husband of the second case, but gonorrhea could not be demonstrated in the wife.

Three had urethritis which was relieved when the Trichomonas vaginalis vaginitis was cured.

As far as could be determined from the histories, the duration was from one week to eleven years, the majority being of a few months' duration, but with about one-fourth running into years. The infection usually had an acute onset.

On a scale of four to represent the degree of irritation and discharge, 12 could be classified as 1, 13 as 2, 8 as 3, and 2 as 4. Some had only slight discharge, and moderate irritation; others profuse discharge and vulval inflammation; at times there was superficial ulceration in the vagina. Three had marked dyspareunia, and with two of these intercourse was impossible on account of pain. Two of the virgins fell in Classes 3 and 4. Three of them had had complete hysterectomies showing that the infection is not dependent upon a cervical lesion.

There have been many treatments described, but I have found nothing better than a simple 1-4000 bichloride of mercury douche, given for the first week twice a day, and later once daily. The douche should be continued during the menstruation at a temperature of 100° F. Only occasionally has it been necessary to use a weaker solution, and in none has there been any evidence of mercurial poisoning. The relief has been prompt, and at times almost magical. The organisms have usually disappeared in three to five days, and rarely have they returned.

Of the 35 cases, 24 were cured. Three remained uncured; the duration of observation was so short in two of these that it is difficult to say what the result will be with longer treatment; two of these were free

of organisms for a time, but at the last examination they were found. Six have been lost sight of since the trouble was diagnosed; they are out of town patients, and it is reasonable to suppose that just as great a percentage of them has been cured.

In using the term cured, it is meant that no organisms have been found in the last few examinations. It is fully realized that these patients are liable to reinfection in the manner in which it was first contracted. Until we have determined how this comes about we shall be at a loss as to how to protect them against recurrences.

Many of them cleared up after two or three irrigations. This work was started in the early summer when patients were leaving for their vacations and I for mine, so it is difficult to determine the length of time it took to bring about a cure. Including the long periods in which many of these patients were not seen after beginning treatment, the total time for the 24 cured patients was 106 weeks, or an average of 4.4 weeks per patient before the organisms disappeared.

The relief of symptoms is prompt, the organisms quickly disappear and even should a reinfection occur, relief can be again brought about.

Until we learn more of the life history of the Trichomonas and its method of introduction into the vagina, we cannot assure our patients that they will not have recurrences.

I feel that the more general recognition of the Trichomonas vaginalis as a cause of vaginitis has been one of the important features in conservative gynecology.

54 East Sixty-Second Street.

(For discussion, see page 113.)

POSTPARTUM ATRESIA OF THE VAGINA

With a Report of a Case of Hematocolpos, Hematometra, and Hematosalpinx

By A. E. Kanter, M.D., F.A.C.S., and A. H. Klawans, M.D.
Chicago, Ill.
(From the Departments of Gynecology, Cook County Hospital and Rush Medical College)

POSTPARTUM atresia of the vagina is an extremely rare condition, particularly when accompanied by a complete retention of menstrual blood. Stenoses of the vagina are reported in a great many instances, but a thorough search of the literature has failed to reveal a single case similar to the one here reported.

Postpartum atresia of the vagina may follow operative deliveries where the bladder and pelvic floor are greatly relaxed with the result that the anterior and posterior vaginal walls lie in approximation.

In such cases irregular tears are very often produced, and even after suturing the approximated vaginal walls have a tendency to adhere. Atresia also occurs in cases where vaginal tears are left unsutured, the raw surfaces coming into contact with each other and adhesion results. This is much more likely to happen where infection of the raw edges has been present.

Occasionally, with failure to completely visualize the extent of an irregular tear, the anterior and posterior vaginal walls are sewed together.

In patients where an ulceration of the vagina follows the use of strong antiseptics in preparing the patient for vaginal examination or delivery, the ulcerated surfaces may come into contact and atresia follow.

In those patients who develop a membranous puerperal vaginitis (diphtheritic, staphylococcic, streptococcic, nonspecific), the vaginal walls may come into contact and the membranes form the basis for the atresia.

With the proper amount of caution, and with obstetrics in the hands of capable practitioners, prevention of postpartum atresia of the vagina should prove rather simple.

Every postpartum patient should be examined vaginally before she is allowed to leave the hospital, and again five to six weeks after delivery. This will at once reveal any slight tendency toward the production of an atresia, and steps for prevention can be immediately instituted.

The treatment of this condition depends on the location of the atresia, the extent of the surfaces involved, and the length of time it has been present. In the majority of cases, when of recent origin, the adherent surfaces can be readily separated by blunt dissection with the gloved finger. Particular care must be taken in this dissection to prevent the production of vesicovaginal fistulas.

In patients where the atresia has been of long standing, sharp dissection is employed, one finger being inserted into the rectum and the bladder being lifted as far away as possible by means of a retractor. Dissection is continued until the adherent vaginal walls are entirely separated, the greatest caution being constantly observed to prevent entering either the bladder or the rectum. Following this dissection the vagina is kept patent by means of glass pessaries or by packing with iodoform gauze, the packing being removed and replaced each day. The patient should be observed for a period of six months to a year in order to prevent reformation of the atresia, and as soon as further closure is in the least evident further dilatation should be instituted.

Inasmuch as the patient continues to menstruate, the blood that is passed is held back by the atresia and in the course of time fills and

dilates the vagina, the uterus, and the tubes. If this has taken place, the syrup like tarry blood is evacuated before packing the vagina. If this condition is allowed to exist over a long period of time, eventually, by pressure distention and proteolysis, the endometrium and uterine musculature as well as the endosalpinx and the surrounding musculature are destroyed leaving thin-walled sacs which are mainly made up of visceral peritoneum. In a patient who has had her pelvic organs filled with blood over a long period of time further studies should be made with lipiodol injection, and if nothing but thin sacs are found to remain, these should be removed.

CASE REPORT

Mrs. McB., seventeen years old, was admitted to the gynecologic service at Cook County Hospital on September 30, 1929. Her chief complaints were pain in the lower abdomen, dysuria, urinary frequency and urgency, backache, and amenorrhea. She had been delivered of a full-term child on June 15, 1929, the labor having been terminated by the use of forceps without any anesthetic and with no subsequent repair. The baby died soon after birth. The puerperium was apparently without any sort of complication, the patient passing lochia for three days and having no further vaginal discharge of any kind.

About one month after delivery the patient began to sense pain in the lower abdomen. This pain became increasingly worse with rather acute exacerbations at monthly intervals. The urinary difficulties complained of had become more and more annoying until the time of admission to the hospital. There had been no passage of blood from the vagina during all this time.

General physical examination was negative as were the laboratory findings. There was a slight distention of the lower abdomen, tenderness over the lower middle quadrant, and a sense of resistance in the lower left quadrant suggestive of a mass in that region. Bimanual examination revealed a multiparous introitus. The vagina was patent for only about one inch and no passage could be found on either side. Rectal examination disclosed a large, soft, boggy mass filling the vagina from side to side and making palpation of the internal genitals impossible.

Pneumoperitoneum showed the uterus and the left tube to be greatly enlarged.

Under gas anesthesia attempts to separate the adhering walls of the vagina were at once successful. The atresia was found to have taken place between the anterior and posterior vaginal walls at about the level of the entrance of the urethra into the bladder. A large amount of tarry blood issued from the vagina as soon as the adherent walls were separated. Further examination revealed an only moderately enlarged uterus with barely palpable adnexa. The vagina was tightly packed with iodoform gauze.

The packing was removed and the cavity was repacked at two-day intervals for a period of two weeks. On leaving the hospital the vagina was patent and pelvic palpation revealed no abnormal findings.

The patient was seen about one month after operation and she reported that menstruation was normal and coitus had been performed without difficulty. The vagina was patent and easily admitted two fingers.

310 South Michigan Avenue.

A CASE OF ABDOMINAL PREGNANCY, WITH THE DIAGNOSIS CONFIRMED BY UTEROGRAM

By George R. Osborn, M.D., F.A.C.S., Tulsa, Okla.

OWING to the infrequency of abdominal pregnancy and to the variations in symptoms and physical findings, it is not always easy to make a positive preoperative diagnosis.

In a suspected case, with a live fetus, one might justly hesitate to pass a sound through the cervix, even if gestation had progressed to the stage of viability. For a pregnancy may progress without noticeably unusual symptoms to near term and the fetus die, but the patient, not convinced that it is dead, will not submit to probing the uterus nor to any operative procedure. Such a patient is willing to wait and let time determine whether her baby is alive. Providing there is no separation of placenta, infection nor other complications develop, she may come to no harm by waiting. In fact, if one could be sure that no complications would develop, it might be advisable to wait until the placental blood vessels had become obliterated or atrophied, as it would simplify the removal of the placenta.

In view of the high mortality attending the removal of an abdominal pregnancy any time after the middle of the gestation period, whether the fetus be living or dead, an early positive diagnosis is important.

A uterogram makes a positive diagnosis possible at any stage and is a safe and simple procedure.

In the case with which this report deals, the patient had not consulted her physician regularly for prenatal care because she was a Christian Scientist. However, when she passed the estimated time for her confinement, she became greatly concerned as she was very desirous of having a child and, while she was respectful of her physician's ability, she was loath to accept his diagnosis of a dead fetus. It was to add the weight of another's opinion that she was sent to me.

Mrs. F. W., white, primipara, aged twenty-six, married eight years and has had no miscarriages. First seen and examined December 11, 1928. Her general health was good; she never had any serious illness, menstruation was normal. Last menstruation preceding pregnancy, December 16, 1927. "Spotting" in January. History of pregnancy otherwise uneventful until August 28, when she had some disturbance and death of the fetus was diagnosed by Dr. Stambro. She menstruated September 23 to 26; October 27 to 30; November 29 to December 1. These periods were normal and had none of the characteristics of hemorrhages or show, although they were believed, by the patient, to be the signal show, characteristic of the onset of labor. She had no pains, however, at any time. The physical examination shows her to be well nourished, though of slight build, with no edema, no gaseous distension of the abdomen. Skin was clear, and there was no coating of tongue. Temperature 99° F.; blood pressure 120/80. Abdominal examination showed a hard mass of the consistency of a fibroid, quite regular and like in shape to a pregnant

uterus of about seven months' gestation with one cornu (the left) extending higher than the other. (According to her history the abdomen had been larger.) No fetal heart sounds or movements. Vaginal examination showed normal vaginal mucous membrane; no laxity of walls as in pregnancy at or near term. Cervix small nulliparous type; firm and closed. Posterior to cervix, fetal head could be felt but could be moved very little. Anterior to head might be felt what appears to be an elongated fundus extending slightly to the right.

From the examination and a history of three menstrual periods since the estimated end of term, a diagnosis of abdominal pregnancy with death of the fetus was made and while the patient had brought with her an x-ray picture taken by Dr.

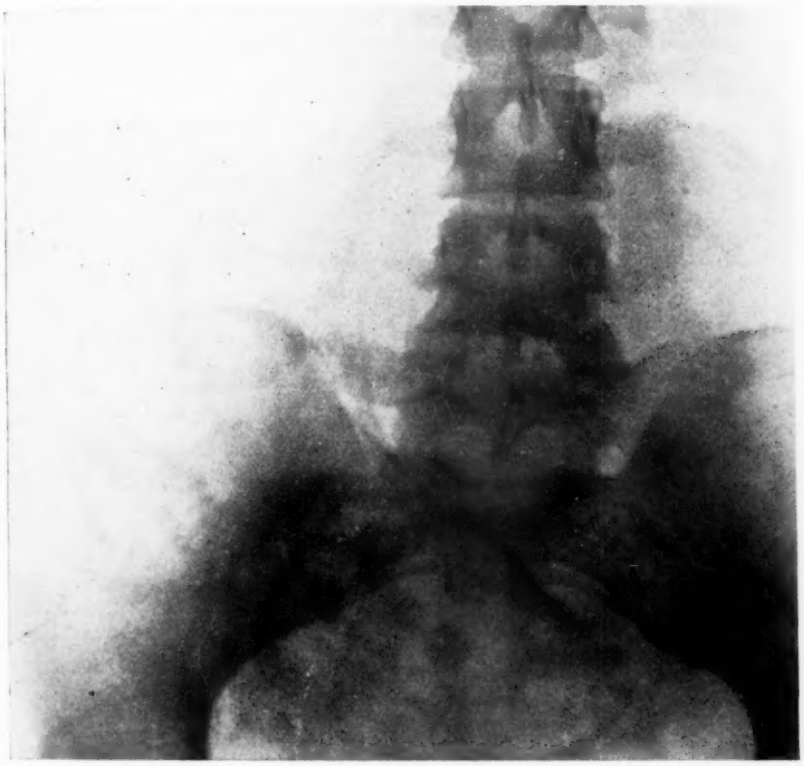


Fig. 1.—Showing fetus on right side with the head over brim of pelvis. Nothing in this picture to indicate extrauterine pregnancy.

Stambro, her physician, which showed the fetus plainly, a request was made for another picture with a lipiodol injection of the uterus. She submitted to having another x-ray picture made but refused the lipiodol injection because she still thought she felt the movement of the fetus.

The second skiagram (Fig. 1) showed nothing different from the first and she returned to her home.

Two weeks later she returned to my office with Dr. Stambro, who had induced her to have the uterogram made.

She complained of no discomfort from the lipiodol injection. Ten c.c. were injected with ease and the accompanying skiagram (Fig. 2) corroborated the diagnosis of abdominal pregnancy, and convinced the patient of her unfortunate condition, and on December 28 she was operated upon by Dr. Stambro to whom

I am indebted for the privilege of assisting and thus following to the end this interesting case.

On opening the abdomen the omentum was encountered adherent in several places over the membranes. This omentum was ligated and excised at all points of contact, revealing the placenta attached to the posterior aspect of the left broad ligament, ovarian ligament, and to the anterior surface of the sigmoid flexure of the colon. The placenta was as large as a medium sized, full-term placenta and had been pushed up out of the pelvis by the head and shoulders of the fetus which were well down in the posterior culdesac. The left tube and broad ligament were drawn taut over the anterior surface of this placental mass which extended well up above the umbilicus. This was what appeared, upon physical examination, to be the left cornu of the uterus extending higher than the right. The broad ligament, fallopian tube and ovarian ligament were clamped and cut, releasing the entire mass except a small attachment in the left culdesac and the anterior surface

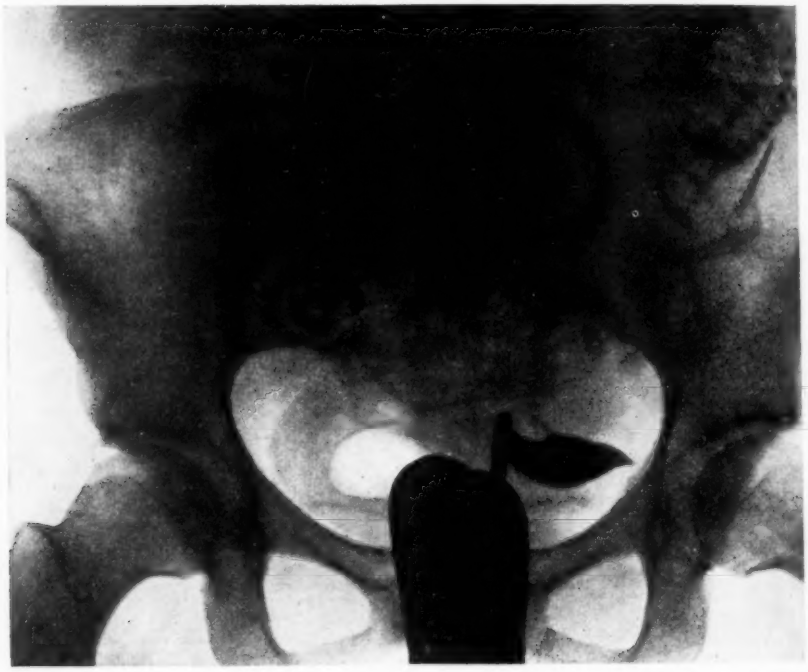


Fig. 2.—Showing fetus in same position as Fig. 1, taken two weeks previously, also some changes in shape of head due to overlapping of cranial bones. To the right, and low in the pelvis, the injected uterus confirming the extrauterine pregnancy. No lipiodol showing outside the uterus, indicates closed tubes.

of the sigmoid. The attachment to the sigmoid was at the edge of the placenta and the reflection of the membranes. The obliteration of the placental circulation had reduced this attachment to a pedicle or band about two and one-half inches wide which, under traction, was easily clamped with two clamps and cut between, leaving a narrow, longitudinal strip on the bowel to be peritonealized. The small attachment in the posterior culdesac was separated easily by dissection with the gloved finger where a small amount of bleeding occurred, but was soon controlled by hot pack after removal of the placenta and fetus intact; the membranes unruptured. The left tube and ovary and a good portion of the left broad and ovarian ligaments were removed attached to the placenta. The abdomen was closed without drainage.

The uterus was not enlarged and appeared normal except for a slight roughening of the peritoneal covering on the posterior surface. The right ovary and tube were normal except for a roughening of the peritoneum of the tube. There were no adhesions or pathologic abnormalities apparent in the abdomen or pelvis, except a slight enfolding of the fimbria of the right tube. No attempt was made to determine the patency of this tube.

The fetus was a female of about thirty-five weeks' gestation. It was not macerated and probably would have become a calcified mummy.

The patient recovered rapidly and left the hospital on the eleventh day after the operation.

Acknowledgement is made to Dr. Morris Lhevine, roentgenologist, whose experience in uterosalpingography lead me to take this method of confirming the diagnosis of abdominal pregnancy in this case.

801 Medical Arts Building.

CESAREAN SECTION AND SUBSEQUENT LABOR

Report of Cases

By Roy L. Grogan, A.B., M.S., M.D., Fort Worth, Texas

KNOWING full well that previous cesarean sections are a positive indication for subsequent sections under certain conditions, this communication is not presented as an argument for the general practice of allowing parturients the test of labor, who previously have undergone cesarean sections for various reasons, but merely as evidence that under ideal conditions, certain cases may be delivered by the natural passages, after having had as many as three abdominal sections. Without entering into a discussion of the merits and demerits of this elective method, the plan of procedure and report of two cases follows:

Careful prenatal observation was enforced to prevent overweight and frequent measurements of the fetuses were taken as the patients approached the end of the gestation period. X-ray determinations of the comparative size of fetus and pelvis supplemented the external measurements. No vaginal examinations were made closer than a month to the time of delivery. When the gestation period had reached about eight and one-half months, and knowing that no disproportion existed, the patients were sent to the hospital. After routine preparation for delivery, under strictest aseptic precautions, a tampon saturated with four per cent mercurochrome was put into the vagina. The delivery room was set up for both delivery and laparotomy.

After the tampon had remained one hour in the vaginal canal, the patient was prepared, draped, and under light nitrous-oxide anesthesia, a No. 4 Voorhees bag was introduced into the cervix. The patients were not moved from the delivery table, but watched closely from the onset of contractions to the termination of labor. Upon expulsion of the bag and completion of dilatation, prophylactic forceps were applied to shorten the second stage of labor.

Case 1.—Mrs. E. W. J., aged twenty-seven, para iii. First labor, gave birth to a stillborn child in 1920. Recovery uneventful. Weight 7 pounds, cause of death undetermined.

In 1925, at about the seventh month, she began having some edema of face and limbs. Was told she would have convulsions if not delivered at once and was advised to have an abdominal section. This was done. A three and one-half pound child was delivered which was viable.

Patient became pregnant in 1926 and came on my service about five and one-half months' term. She cooperated thoroughly, not only did she not gain weight but lost five pounds during the remaining months and was delivered normally Nov. 24, 1926, of a normal seven pound female child, the above method being used. Recovery was without morbidity. The patient is now again pregnant and barring complications, will be delivered by the same method.

CASE 2.—Mrs. C. D. F., aged thirty-four, white, married 14 years, para iv. Had three abdominal sections, one laparotomy for adhesions, one application of radium for metrorrhagia and menorrhagia (900 mg. hours.), and tonsillectomy.

Menstruation active at twelve and of twenty-eight-day type, three to five day flow, free amount, marked dysmenorrhea. Three children, one stillborn, weights at birth 12, 8, 7½ pounds. Two children living and well. First labor: Prenatal period uneventful. Twenty-four hours of labor with fundic type section. Puerperium stormy. Second labor: Allowed test of labor. The labor was approximately twelve hours duration followed by fundic type section. Puerperium stormy, puerperal sepsis, slow recovery. Third labor: Elective cesarean section at term. Fundic type with normal puerperium.

Present history.—Due to radium application, patient had not menstruated for nearly two years, was nauseated and vomited considerably during months of May and June and had persistent headaches. Weight when first observed 124 pounds, blood pressure 108/60, urine negative.

Physical examination.—Unimportant, except midline scar extending from pubis to 8 cm. above umbilicus. Uterus, size of grapefruit, fixed by adhesions over fundus and tender. Pelvic measurements: Sp. 25, Cr. 27, Tr. 31, Bd. 20, C.d. 11½, C.v. 11. January 5, patient weighed 138 pounds, blood pressure 116/74, urine negative. Uterus midway between umbilicus and xiphoid process. Massive intestinal adhesions over fundus of uterus. Cervix soft and easily dilatable. X-ray examination revealed cephalic presentation of fetus, head engaged. Estimated weight 6 pounds 4 ounces. Patient was sent to hospital for induction of labor.

A No. 4 Voorhees bag was introduced at 1:00 P.M., expelled two hours later. Rectal examination at that time revealed cervix effaced, 6 to 8 cm. dilatation, presentation R.O.P. Under nitrous-oxide and oxygen, patient was allowed to have pains for about forty minutes, which were irregular but markedly strong. At the end of forty minutes, after expulsion of the bag, complete dilatation was found. After rotation from the posterior position, a delivery by modified Scanzoni of a normal, female child was accomplished, weight 5 lb., 14 oz. No hemorrhage and only first degree lacerations of perineum were noted. Recovery was without morbidity. At present mother and child are doing well.

CONCLUSION

It is apparent from the above cases that a normal delivery under ideal conditions can be accomplished after as many as three cesarean sections.

A note of warning must be sounded that precautions must be taken in order to be able to take care of any threatened rupture which may arise during process of labor.

905 MEDICAL ARTS BUILDING.

PAPILLOMA OF THE ENDOMETRIUM*

By W. A. Dafoe, M.D., Toronto, Ont.

(Fellow in Obstetrics and Gynecology, University of Toronto)

THIS case which I am reporting, is of interest from a pathologic, as well as a clinical standpoint.

Mrs. R., aged fifty-nine, para ii, menopause at fifty. Had a pernicious anemia twenty years previously, otherwise well.

Present Complaint: Slight vaginal bleeding at irregular intervals for six months. No pain. No history of discharge.

Examination: No bleeding from cervical canal. Cervix showed slight area of erosion. Uterus was normal in position and size and was freely movable. Fornices were clear. There was some eversion of the anterior and posterior vaginal walls.

Diagnosis: On account of the patient's age and history, a carcinoma of the uterine body was suspected and a curettage was advised. This was done two weeks later.

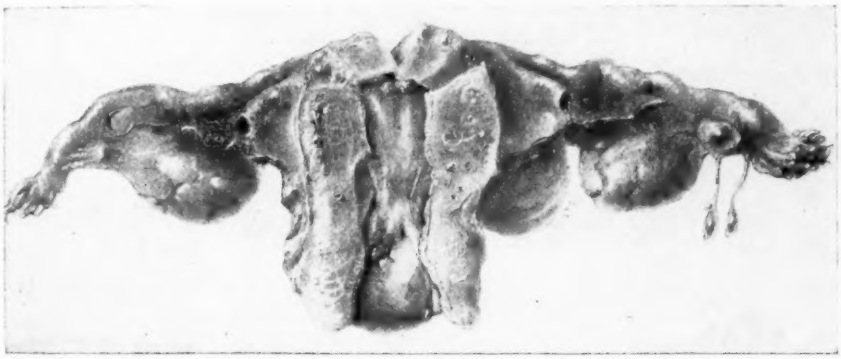


Fig. 1.—The papilloma may be seen at the upper portion of the endometrial cavity. Close to this is a small submucous fibroid.

The curettings were moderate in amount, rather thick, somewhat friable, and suggested malignancy. A microscopic examination showed a papillomatous growth made up of numerous branching finger-like processes. Each process consisted of a central core made up of a loose mesothelial structure and covered by a single layer of low cuboidal epithelium. These epithelial cells were small, contracted and set upon a basement membrane. In some areas, the central cores of the projecting processes had undergone a hyaline degeneration and in other areas the mesothelium was infiltrated with blood cells. The latter findings gave those portions the appearance of degenerating chorionic villi. Glands, or gland-like structures were entirely absent from the section. There were no signs of malignancy, and the pathologic diagnosis read papilloma of the endometrium.

About one month later, a complete hysterectomy was done. On examination of the specimen, the tubes and ovaries were found to be normal. The uterus was normal except for a small subperitoneal fibroid on the left side. The uterine cavity showed a small area about ½ inch in diameter, on the upper portion, made up of

*Read at the Academy of Medicine, Toronto, October 22, 1929.

a glistening collection of rounded elevations, at the outer edge of which there was a small submucous fibroid.

I have only been able to find two other cases of similar nature reported in medical literature: one by Haultain in 1913; a patient aged fifty-nine, who gave a history of vaginal bleeding at four to six weeks' intervals ever since she was forty-seven years of age. Her menopause occurred at forty-five. A curettage was done but six weeks later the symptoms recurred and a hysterectomy was done. The other reference was to a case of Bland Sutton's who removed the uterus in a woman aged eighty-three. The microscopic findings in both of these cases were exactly similar to those described in this report.

Fig. 2.—An enlarged drawing of the papilloma showing the glistening collection of rounded elevations.

CONCLUSION

Growths, apart from pregnancy, arising from the endometrium are practically always made up of glandular elements with a small amount of stroma as a supporting structure, but in the papilloma we have a warty growth with a fibrous connective tissue core covered by a single layer of low cubical epithelium. This is apparently innocent in nature. In the case quoted by Haultain the symptoms were present for twelve years. However, in each of the three cases, a hysterectomy was done because of the possibility of these growths becoming malignant, and also because of the unsatisfactory results which sometimes follow curettage.

I wish to thank Dr. Gordon Gallie for his permission to report the above case.

THE METHOD OF IDENTIFYING NEWBORN INFANTS AT THE BOSTON LYING-IN HOSPITAL

By Frederick C. Irving, M.D., F.A.C.S., Boston, Mass.

A METHOD for identifying newborn infants in a hospital should be reliable, simple, and reassuring to the mother of each baby. The device used should be indestructible and inexpensive. In some institutions cardboard or celluloid tags are attached to the babies; in others tapes marked with indelible ink are sewed about the wrists and ankles. As the result of the frequent washings and oilings given to newborn infants such means of identification often become illegible

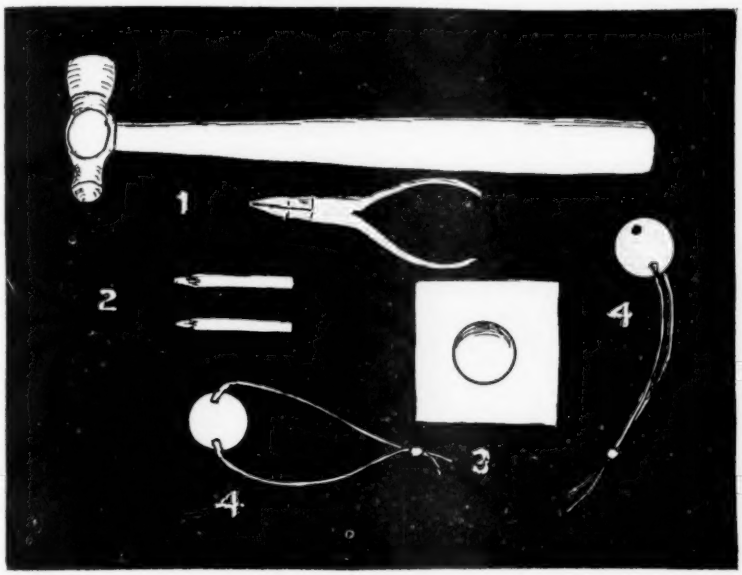


Fig. 1.—Outfit for marking babies. *1*, Pliers for crushing perforated shot. *2*, Two of a set of dies for stamping names on disks. *3*, Anvil with countersunk area in which disks are placed for marking. *4*, Identification disks.

and must be replaced. Tapes have a tendency to roll themselves into cords which require unfurling before the name of the baby can be deciphered. The name in the bead necklace is easily read but should another infant of the same surname be born the necklace of the first child must be removed, partially unstrung, one or more identifying initials added, the restringing completed and the necklace reapplied. After the baby is discharged, the necklace must be disassembled and each component letter placed in the proper compartment of the box.

There seems to be much lay faith in the efficacy of footprints in the identification of newborn babies. It should be evident, however, that

no nurse can select the proper baby from a nursery and take it to its own mother's breast simply by looking at the soles of its feet. All hospitals that use the footprint method must employ other means of identification, such as the tag, tape or necklace. For practical purposes the taking of footprints merely adds an unnecessary maneuver. Footprints and finger prints, to be of value, must be taken by a person skilled in this procedure. The average nurse has no such special ability. Not a few of the impressions taken by the delivery room staff are unintelligible blots. The classification of these friction ridge impressions is a science in itself.

With these facts in mind we have instituted the use of the army aluminum identification disks at the Boston Lying-In Hospital. As the disks come from the manufacturer, they have two holes punched in them and are stamped in pairs with serial numbers. At the time of delivery the mother's surname is cut on the back of each one of a given pair bearing on the other side the same serial number. When

Fig. 2.—Disk applied to neck of infant. Name side out.

Fig. 3.—Disk applied to neck of infant. Number side out.

the baby is born, one of the tags is affixed to the infant and the other to the mother. Should there be more than one mother of the same surname in the hospital, this situation is taken care of by the serial numbers. For instance, there may be "Jones, A 1094," "Jones, A 1101" and even "Jones, A 1105." The tags are inexpensive, indestructible, and always legible, as the names and numbers are cut into their surfaces with dies. Any time the baby is brought to breast the mother may reassure herself that she has the right infant by comparing the serial number of her own tag with that of the baby. A method of identification is provided which is simple and positive.

The operation of the method is explained by the following rules, which are posted in every case room:

1. When each patient is approaching delivery two metal tags, *bearing the same number*, are to be prepared by the nurse in charge of the delivery floor as follows:

a. *Each tag* is placed face down on the anvil and marked with the patient's last name.

b. A piece of waxed fish line one foot long is threaded through one hole of one tag and both holes of the other tag.

c. The two ends of the fish lines on each tag are passed in the same direction through the hole in a perforated shot, and the shot is slipped down as near the tag as possible. The two ends of each piece of fish line are then knotted.

d. The two tags are sterilized with the delivery kit.

2. After the cord is tied and cut, the staff member, resident, house officer, extern, nurse or other person delivering the baby will select the tag which has been threaded through one hole. He will slip the shot away from the tag, thus

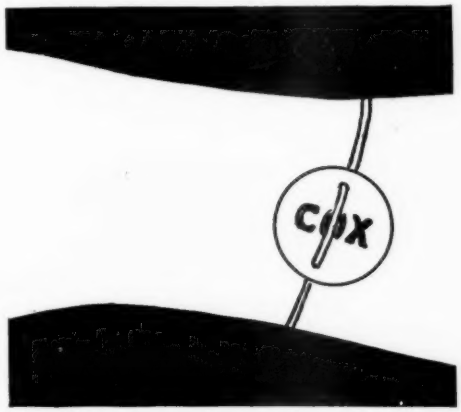


Fig. 4.—Disk applied to left wrist of mother. Name side out.

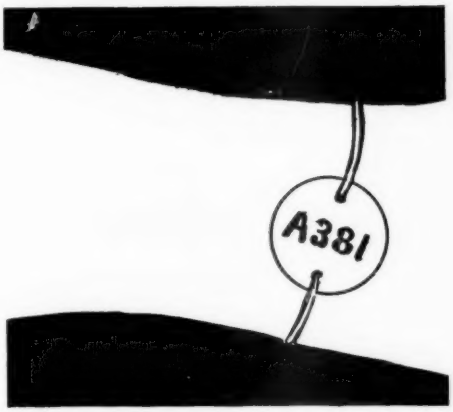


Fig. 5.—Disk applied to left wrist of mother. Number side out.

forming a loop. This loop is placed over the baby's head and the shot moved back, thus reducing the loop to such a size that it cannot be slipped over the head. Enough slack should be allowed to permit the insertion of three fingers between the loop and the baby's neck. The shot is then crushed with a pair of pliers.

3. Before the person delivering the baby leaves the room, he will place the loop of the other tag over the mother's left wrist and adjust it to such a size that it cannot be slipped over her hand. He will then crush the shot with the pliers.

4. Before the person delivering the baby leaves the room, he will see that the nurse in charge of the case has entered at the top of the delivery sheet the same serial number that is on the two tags. He will also see that the name on the chart corresponds to that on the tags affixed to both mother and baby.

5. Should delivery occur so rapidly that there has been no opportunity to prepare tags, the tags are to be marked and sterilized during the delivery. No exception is to be made to this rule.

6. Tags are not to be removed from either mother or baby during their stay in the hospital.

7. At the time the mother and baby are discharged both tags are to be removed at the front door, and the numbers and names compared in the presence of the mother. The tags are then tied together and are kept for one year, at the end of which time they are to be thrown away.

8. Should a baby remain in the hospital after the discharge of its mother, its tag is not to be removed. In such a case the mother's tag is to be attached to the baby also until the infant is discharged.

9. In case of multiple pregnancy (twins or triplets) a tag is applied to the mother's wrist for each baby. The first baby born receives the lower serial number, the second the next higher, and so on.

10. All stillborn, macerated or nonviable fetuses are to be marked in this way.

11. The above rules also apply to all private patients delivered in the hospital.

221 Longwood Avenue.

A STETHOSCOPE FOR AUSCULTATING THE FETAL HEART*

By Morris Leff, M.D., New York, N. Y.

THE stethoscopes used for auscultating the fetal heart have been the same as those used for the chest. The physical contour of the abdomen should require a different type of instrument. The use of the ear directly is an uncomfortable and unesthetic procedure which should be reserved for exceptional occasions.

The stethoscope presented in Fig. 1 has some features which make it especially suitable. It consists of two parts (Fig. 1): *A* is analogous to the chestpiece, and *B* resembles the usual binaurals. Part *A*, or the bell, consists of a metal weight three inches in diameter and weighs two pounds. Its undersurface has a concavity, at the apex of which is an opening, which is continuous with the handle or stem of the instrument. This handle is hollow and is connected with an adaptor to the binaurals *B*.

The advantages of this stethoscope† are as follows:

1. The weight of the instrument is sufficient to keep it in place on the abdomen, without the need of extra pressure.

2. As no outside pressure is necessary, it eliminates the friction sounds which are produced by the fingers or rubber bands.

*Presented before the Section of Obstetrics and Gynecology of the New York Academy of Medicine, October 22, 1929.

†Manufactured by Geo. Tieman and Co., 107 East 28th St., New York.

3. Its greater surface and the fact that it can be moved from one spot on the abdomen to another quickly, facilitate the localization of the sounds.

4. There is no strain produced when listening to the sounds for any length of time.

5. On account of its larger surface its weight is distributed over a bigger area, and it thereby disturbs the patient less than the pressure of the ordinary stethoscope.

6. The fetal heart sounds can be heard while there are noises in the room.

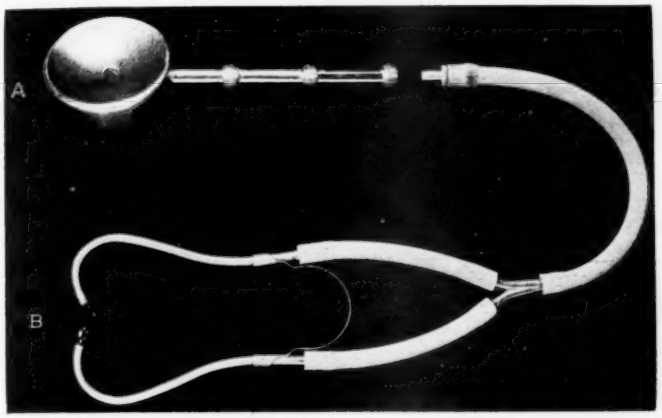


Fig. 1.—Fetal heart stethoscope; *A*, bell; *B*, binaurals.

7. The hands are left free, either to hold a watch, to compare the fetal and maternal pulse, or for any other purpose.

8. It can be placed under the sterile sheet on the abdomen during a delivery, and the nurse can watch the fetal heart sounds at all times.

9. It is also useful when doing a Rubin test. The operator himself can listen to the sound of the air passing through the tubes, while it leaves his hands free to do the test.

Both doctors and nurses who have used this stethoscope find it preferable to the ordinary type.

15 East One Hundred Eleventh Street.

Society Transactions

NEW YORK OBSTETRICAL SOCIETY

MEETING OF FEBRUARY 11, 1930

DR. H. C. WILLIAMSON presented a report of a case of **Placenta Accreta with Hysterectomy.**

The term placenta accreta implies the development of the placenta with little or no decidua basalis. The villi, therefore, are in direct contact with the uterine musculature. The placenta has become so firmly attached to the uterus that it cannot be normally separated by the mechanism of the third stage of labor, nor can it be completely removed manually from the uterine wall as there is no line of cleavage.

Mrs. M. M., white, twenty-eight years of age, para v, applied to the Manhattan Maternity and Dispensary June 11, 1929.

Menstruation began at fourteen years, was irregular, and there was marked dysmenorrhea until after her marriage at seventeen years of age, when the periods became more regular and less painful.

During her first pregnancy there was intermittent bleeding for four months and a premature delivery occurred at the twenty-eighth week. A living child was born but died in a few minutes. The placenta was retained and had to be manually removed. The puerperium was normal.

The second pregnancy and labor, lasting twelve hours, was normal. The placenta was again manually removed; this time a profuse hemorrhage occurred. These two deliveries took place at her home in Ireland.

In the third pregnancy and labor she was attended by the out-patient service of a New York hospital. The labor was short and the placenta again removed manually with profuse hemorrhage. The uterus was packed immediately and the packing removed forty-eight hours later. She states that the puerperium was febrile, and it was necessary to remain in bed for three weeks.

During her fourth pregnancy she was under the care of the Manhattan Maternity and Dispensary and had a moderately difficult ten-hour labor at home. The baby presented by the breech and weighed nine and a half pounds. The placenta was again retained, manually removed and the uterus packed for hemorrhage. The uterine packing was removed in twenty-four hours. During the first four days postpartum the temperature varied from 99° to 102° F.; during the remainder of the puerperium, it was normal. There was a moderately profuse, foul smelling lochia during the puerperium.

Present Pregnancy.—The prenatal period was normal. The Wassermann reaction was negative. She was admitted to the hospital September 1, 1929, in active labor. The delivery was spontaneous, the total duration of labor twelve hours. For one and a half hours thereafter no bleeding occurred but the placenta could not be expressed. One cubic centimeter of pituitary extract was then given and an attempt made to express the placenta by the Credé method. This maneuver resulted in profuse bleeding. An attempt was then made to remove the placenta manually. The operator estimated that he had removed about one-third of the placenta when he was forced to stop on account of profuse bleeding. The uterine cavity was tightly packed. The patient was in marked shock, with a systolic blood pressure of 45 and a pulse rate of 200. Appropriate measures were instituted and as soon as possible a transfusion of 800 c.c. of blood was given.

On September 3, 1929, her general condition had improved. The blood pressure was 124/72 and the red blood count 3,800,000 with 70 per cent Hb. It was thought advisable to give a second transfusion of 500 c.c. of blood before attempting an operation.

Operation.—The packing was removed and the uterine cavity carefully explored. It felt as though a large amount of placenta was firmly adherent to the uterine wall. A supravaginal hysterectomy was then quickly performed. The uterus presented an unusually ischemic appearance, and there were a few petechial hemor-

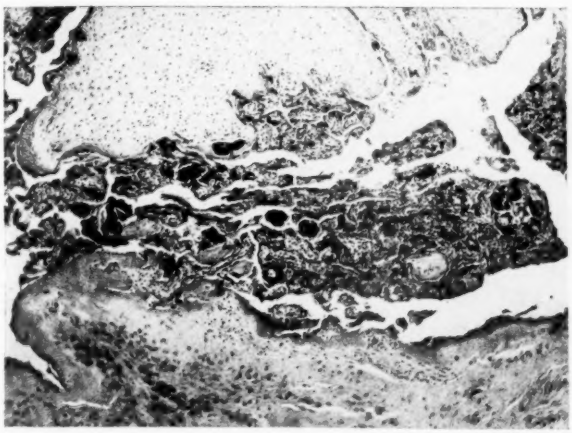


Fig. 1.

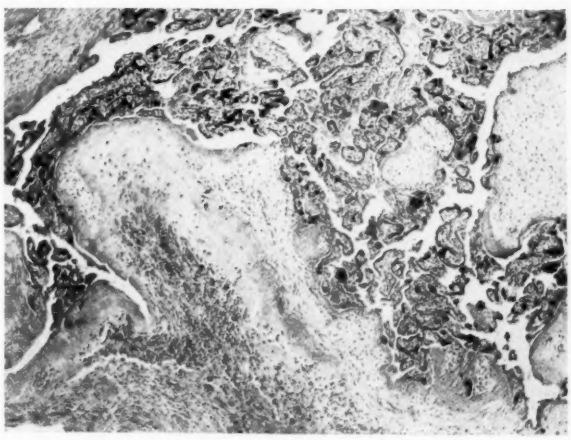


Fig. 2.

rhages on the anterior surface. The postoperative course was uneventful. The highest temperature was 102.4° F. on the second day. It became normal on the third day and remained so thereafter. She was discharged on the fifteenth day. At the follow-up clinic, six weeks later, she was found to be perfectly well.

The specimen was submitted to two pathologists, Doctors Alexander Fraser and James Ewing. Their reports are quoted.

Doctor Fraser.—Sections from the "adherent" patches show no decidua or spongy endometrium. The musculature is riddled with large venus sinuses, making a "spongy layer." In many of these caverns the villi are present and

in places attached. Some are empty and others contain pus. The muscle surrounding them often shows piling up of new muscle nuclei representing regenerating muscle fibers. The outer layer of villi is imbedded in a poorly staining hyaline homogeneous substance containing kariorrhectic pus cells representing probably *necrotic* "endometrial decidua." I interpret this as necrosis of "*endometrial*" decidua and formation of a "*spongy layer*" from the muscle.

Diagnosis.—Placenta Accreta.

Dr. Ewing. The main pathologic features in the sections of the uterine wall are:

1. Practically complete absence of decidual reaction. There are very few isolated foci about 1 mm. in diameter in which there are traces of atrophic decidual cells, but these foci are very scanty.

2. The well-developed fetal villi penetrate deeply into the sinuses.

3. The muscular wall of the uterus ends abruptly in a zone of hyaline tissue in which the villi are embedded or tightly adherent. At these points there is no trace of decidual tissue.

4. There are several strata between villi and musculature which show polynuclear leucocytic infiltration, indicating the presence of some chronic infection.

5. Throughout the deeper musculature there is a moderate invasion by isolated syncytial wandering cells, which is probably normal.

DISCUSSION

DR. ELIOT BISHOP.—The differential diagnosis of this condition from adherent placenta, so called, or partially-separated placenta is that with placenta accreta there should never be any bleeding. In this the speaker seems to contradict himself, as he reports severe bleeding, even though it occurred some time after delivery. Perhaps there may have been a condition of partial accreta.

With his treatment we all must agree, radical as it is, the placenta may be removed only with the uterus, as, to all practical purposes, it is one with it.

I do want to discuss the etiology, however, and to bring a practical point to bear in the prophylaxis, even though many of us will never meet this condition. Dr. Williamson and others feel that a foregoing endometritis is as likely to be a factor as anything. Endometritis has been debated by gynecologic pathologists during the last decade or two, many feeling that it never occurs in the chronic state, only in the acute septic state after childbirth or abortion. The obvious cause of it is invasion of the endometrium with bacteria. This patient had had packing of the endometrium at previous labors to control hemorrhage, which is an accepted procedure. We must all admit that it may be the most perfect medium for introducing bacteria. Technic in the presence of hemorrhage may be more hurried than aseptic, and the gauze has to be carried over the lower birth-canal before it gets into the uterus.

When Dr. William Sidney Smith read his paper before this Society in November, 1925, entitled "Obstetric Heresies at the Brooklyn Hospital," he referred to the methods there used of controlling bleeding postpartum. As soon as bleeding started, the method brought out by Dickinson many years ago of holding the fundus high in the abdomen, to kink the uterine arteries and compressing it between both hands to shut down on the sinuses, in almost all instances was found to control bleeding. If bleeding would ensue on relaxing this maneuver and packing to replace the hands was necessary, the vagina and *never* the uterus was packed. Tight packing of the vagina will kink the uterine arteries and the fundus can be compressed above it. Packing the cavity of the uterus was felt to nullify its efforts, as the sinuses would be kept open and the uterus could relax on the soggy pack. Not only was it felt that better hemostasis was obtained by the other method, but the uterine cavity was not invaded. In addition, with the greater

security of this method, packs were removed and the ordinary vaginal drainage was reestablished no later than twelve hours. At the risk of being dogmatic, the rule of the service is that *no uterus* is to be packed postpartum, and no packs are to remain more than *twelve* hours.

Rare as it is, may we not reduce the chance of acute endometritis postpartum, which in this patient may have been the cause of her placenta accreta, if we will leave the uterine cavity alone, when possible?

DR. E. C. LYON, JR.—Recently I encountered a case apparently of placenta accreta but as yet the report of the pathologist has not been received. If it should prove to be such a case I shall report it later.

The patient was a primipara who came into the hospital through the prenatal clinic and was delivered without any special difficulty after a normal labor. The placenta seemed to be complete. After the delivery the uterus did not contract particularly well, and she was given an added dose of pituitary and of an ergot preparation. Three hours later they reported that the patient was bleeding and had lost about 500 c.c. of blood. We were able to transfuse her and the bleeding ceased. Shortly afterward, however, I received a telephone message that the patient was again bleeding. When I saw her this time she was in marked shock. I felt that hysterectomy would do more for her at this time than any vaginal manipulation. A supravaginal hysterectomy was done.

The interesting point is that the membranes were retained and adherent over quite a section of the uterus. Apparently the part that was retained was a succenturiate lobe about 3 cm. across. It was very firmly adherent to the uterus and the pathologist is of the opinion this succenturiate lobe may be an accreta. The patient had two transfusions of 1000 c.c. in all, and made a satisfactory convalescence.

DR. H. C. WILLIAMSON.—I would like to correct Dr. Bishop. This patient did not bleed for an hour and a half after delivery, and it was only after the one cubic centimeter of pituitary extract and a very forcible Credé maneuver was attempted, when probably part of the placenta was torn loose, that hemorrhage occurred. Then they attempted to remove the placenta manually and tore out part of it, causing profuse hemorrhage and shock. Her first two deliveries were at home in Ireland and, as far as could be ascertained, she was not packed at that time. In New York we do pack the uterus for hemorrhage. We see very few cases of placenta accreta and I do not believe that the intrauterine pack is much of a causative factor in placenta accreta. This patient, of course, had histologic evidence of chronic endometritis with infiltration of polynuclear cells in the endometrium.

DR. H. D. FURNISS presented a paper on **Trichomonas Vaginalis.** (For original article see page 93.)

DISCUSSION

DR. W. H. CARY.—I have had the opportunity of studying thirteen cases in my practice during recent months. The youngest patient was eighteen years of age and obviously a virgin; the oldest was aged fifty-three and had sustained a surgical menopause nine years ago. In the latter case sexual continence had been maintained for two years and the history of infection was of one year's duration. In these two cases sexual intercourse could be ruled out as an etiologic factor. Not one of my patients had children. In one case the trichomona symptoms began during the week subsequent to miscarriage. In two instances this organism was found as the cause of acute vaginitis in the later months of gestation. In one case the symptoms were entirely relieved subsequent to delivery and the other patient passed from observation.

In several of my patients saline washings were taken from the finger tips, from the folds about the prepuce and anus, and from the urethra, with negative findings, although the organism was actually present in the vagina. The handling of house pets and irregular sexual habits were investigated without helpful significance. Mucus was sucked from the cervix and examined microscopically routinely without the organism being found in a single instance. I doubted that the alkalinity of the cervical secretion was a prophylactic factor, for the living Trichomonas had been observed in two semen specimens removed from the vagina, where the alkalinity of the pool was marked. The activity of the spermatozoa did not seem to be adversely affected.

It was noted that these patients were comfortable during menstruation, the acute symptoms relapsing shortly after the conclusion of the period. In two or three cases, the trichomona was found shortly after menstruation and subsequently disappeared. From the history obtained I believe that transient infection by the trichomona occurred postmenstrual with considerable frequency. Almost without exception my patients gave a history of a nonirritating leucorrhea for some time before the onset of acute symptoms typical of trichomona. From these observations I am led to conclude that possibly all women are subject to infection from this organism and that a local or constitutional condition accounts for the acute and persistent invasion.

My results in the treatment of Trichomonas vaginitis did not make me as sanguine as Dr. Furniss. Patients had not been hospitalized but the three vigorous treatments carried out on alternate days with green soap scrub, bichloride irrigation, etc., as described by several writers, have been followed by relapse of the infection several weeks later. The discomfort sustained by patients as well as the indifferent results obtained caused me to abandon this treatment. I now treat my patients in the knee-chest position, the folds of the vagina being thereby smoothed out. The vagina is carefully cleansed and dried and a 2 per cent solution of silver nitrate is then copiously applied to all parts of the vagina and external genitals. Air is used to dry this solution and a tampon is then applied to separate the walls of the vagina. This treatment gives immediate relief from discharge and itching. For follow-up treatment lysol or bichloride douches have seemed the most effective. Almost any antiseptic seems to destroy these organisms but the penetration into the tissues may be requisite.

DR. A. M. JUDD.—I have had one case under treatment for over a year and have succeeded in getting her cleared up, only to have her return with an apparent reinfection. I never have been able to isolate the organism from the vaginal discharge, but have isolated it in the catheterized specimen of urine.

DR. F. C. HOLDEN.—During the past year we have had 83 cases in our office. When one considers that one woman had been treated seven days a week for a year for gonorrhea, that at least five had been operated upon vaginally and abdominally for the cure of this condition, and that the disease was described in 1834, and that many different men with whom I have talked about this, since my interest was stimulated in the subject, knew nothing about it, and that as experienced an observer as Dr. Robert L. Dickinson, when I showed him a clinical case in the office, said, "I have seen this condition clinically for years, but have never known the cause of it," and then we showed him the hanging drop specimen, it is perfectly astounding. Many of these women suffer extreme mental agony, they have a discharge, dyspareunia is terrific, many operations have been suggested and yet the actual cause has gone unattended.

In this series of 83 cases, 50 had previously seen other physicians for other conditions. Two of them had been told that they had carcinoma of the cervix and biopsy specimens were taken. Six were told they had gonorrhea; of course, gonorrhea may also be present.

In 89 per cent of the cases leucorrhea was the chief complaint. In 9 per cent leucorrhea was only a secondary complaint. Two had mild vaginitis and no other subjective symptoms. Fourteen were postmenopausal. Seventeen occurred in virgins. The ages of the patients ranged from sixteen to sixty-five years. The condition has been found during the course of gonorrhea just as during pregnancy.

We have tried every treatment that has been talked about. The organisms are killed in antiseptics. Saline will kill them; at least you cannot find them if the patient has had a saline douche, and under the circumstances you cannot get a hanging drop. The best time to get the drop is after the menstrual period, if the patient has had no treatment. We had one case recur after seven months of apparent cure.

In respect to the question of treatment: in the married woman who has had babies you cannot do a one finger examination where she has a bloody vaginal discharge. I recall one case which was sent to me by a New York urologist this year. She had had an abdominal-vaginal operation upstate. He said, "She now has a bloody vaginal discharge and I fear she has a recurrence of carcinoma." In that instance the acute symptoms cleared up in two weeks. She had a very active case of Trichomonas vaginitis. Our method of treatment is as follows: We tip the table—in the acute case you cannot wash out the vagina with green soap as it is too irritating—dry the vagina, instill some mercurochrome and put in a small wool tampon, which we cover, using a tongue depressor, with Lassar's paste. This holds the vaginal walls apart and is kept in for two days, when the patient returns for another treatment. Usually the acute symptoms subside quickly. In treating an acute inflammatory condition of the vagina we must think of the vaginal walls as being in contact. To get those surfaces well apart and to keep them separate, drying would be ideal if it were practicable, but it is not. Lassar's paste answers the purpose of keeping the vaginal walls separate. The next time the patient comes in you can use the treatment of washing out the vagina with green soap, drying, and then bathing the vagina with full strength pyroligneous acid which we have used for years in the so-called senile vaginitis secretion which in fact may be trichomonas. I am sure I have cured this condition long before I knew the cause of it.

Many of these women have a rather active erosion of the cervix which has been cauterized. This erosion clears up after the cure of this ulcerative condition. In many there is an eccentric erosion distant from the canal, a horseshoe-shaped erosion, which clears up very promptly.

DR. H. D. FURNISS.—A point to be noted is that we do not always relieve the patients of the leucorrhea when we relieve them of the Trichomonas vaginalis infection because they sometimes have a cervical leucorrhea, and that of itself will need treatment.

DR. W. T. KENNEDY read a paper entitled **Reconstruction of the Cervical Ligaments Following Complete Hysterectomy.** (For original article see page 51.)

DISCUSSION

DR. G. G. WARD.—The fact that strikes me as of particular interest is that I presume the majority of operators do a supravaginal hysterectomy because it is much easier in the average case, and also due to the fact that we all recognize that there is a slightly increased mortality rate associated with complete hysterectomy, as well as a slightly increased morbidity rate. A number of men, however, have consistently opposed this general practice and have taken the position that where the uterus is removed, the cervix should also be removed unless there

is some contraindication. Notable among these is Herbert Spencer of London, who has particularly advocated panhysterectomy as the correct procedure. Personally, I must plead guilty of having done the easier operation in the majority of cases in the past.

In our Cancer Clinic at the Woman's Hospital we have had quite a few cases in which a supravaginal hysterectomy had been done, and later carcinoma of the cervix developed. I can recall, I think, 12 cases in the past ten years among those we have reported, which we have radiated. We feel therefore that we should pay more attention to the importance of removal of this danger zone when doing an hysterectomy if it can be done with safety to the patient. The ordinary technic for complete hysterectomy is sometimes bloody and quite difficult. Richardson of Baltimore, as you know, has advocated a technic which is very much less bloody and which leaves a better vaginal vault. Dr. Ralph Worrel of Australia, who was a guest several years ago at the meeting of the American College of Surgeons, has advocated for many years an operation which is practically, as far as I can see, the same as that of Dr. Lahey of Boston, which is simple and effective and conserves the natural support of the vaginal vault. I followed his technic in a few cases with satisfaction. After having ligated the vessels and having everything free except the cervix, an incision ¼ inch deep is made completely around the cervix, just above the uterosacral ligaments, leaving the uterosacral ligaments, the cardinal ligaments, and the uteropubic fascial plane intact. Then getting into the line of cleavage between the musculature of the cervix and the mucosa with blunt scissors, the result is that there is very little bleeding and you can quite easily peel it out, leaving a shell of musculature or collar of the cervix with the ligaments attached. In this way the vaginal portion of the cervix and the mucosa is completely removed.

In so far as Dr. Kennedy's procedure is concerned, it consists, as I understand it, in closing of the vault after saving these parts by sewing them anteroposteriorly instead of laterally, which is the usual way of doing it, and I understand from that that he gets a stronger support of the vaginal vault. While I have not done that technic, I am interested to know whether it is one which gives a better vaginal vault than the other operations. If it is not too complicated I think it will have merit, but, of course, it must be tested out by a number of operations.

DR. R. M. RAWLS.—The point that particularly appeals to me is the fact that in cases of marked rectocele with a possibility of enterocele following, by using the doctor's technic on the uterosacral ligaments, we will prevent this disagreeable result in some of our hysterectomies.

I think, also, that in the paper Dr. Kennedy did not emphasize sufficiently the applicability of this procedure to supravaginal hysterectomy. In supravaginal hysterectomy the supports of the cervix are more or less sacrificed if we have to take the uterus out at the internal os, where most of us attempt to do, or below it. If we do the operation in this way (and this is usually the procedure I follow) we disturb the pelvic diaphragm, and when we amputate the uterus from the cervix, we will find, just as when a leg is amputated, that the supports retract back from the cervix, and too often we simply bring together the cervical tissue and allow the supporting structures of the anterior and posterior wall to retract. I have previously called attention to the fact that it was necessary to go beyond the cervix and bring the tissues together over the cervical stump and incorporate them in the cervical stump. It has been my custom in complete and in supravaginal hysterectomy to be sure to close this vault that is supporting the vault of the cervix and uterus when it is in. If we disturb this and do not take the trouble to bring it back, we will find, as has been my experience in some cases of supravaginal hysterectomy, the cervix prolapsed.

DR. BYRON H. GOFF.—Dr. Kennedy has spoken of the cardinal ligaments and other portions of the pelvic fascia which normally are attached to the cervix. I should like to comment briefly on the origin of the fascia which is attached to and which supports the cervix.

The standard textbooks on anatomy and the texts on gynecology state that the fascia which surrounds and supports the pelvic visceria takes its origin from the layer of fascia that covers the superior surface of the levator ani muscle. Halbin, who has made a very exhaustive study of the pelvic fascia, disputes this teaching. He contends that there are two separate and distinct systems of fascia in the pelvis, one which surrounds and supports the pelvic organs (fascia endopelvina), and another which sheathes and attaches the voluntary muscles of the pelvis (muscle fascia). This view is supported by Tandler, and by Gallaudet, who has for many years made an extensive study of the fasciae of the body in his work at Columbia University. It has been my privilege to have witnessed a convincing demonstration of the two fascial systems in dissections by Dr. Gallaudet.

The descriptions of the fascia of the pelvis as given by the previously mentioned authorities are clear and easily understandable, while those given in the texts on anatomy and on gynecology are vague and misleading.

DR. HERMANN GRAD.—I am very much impressed with this operation and believe it gives the pelvic diaphragm a proper support. I was also very much interested in the doctor's mortality. I find that his mortality in complete hysterectomy is extremely low, 1.8 per cent. In 246 cases of my own the mortality was 1.6 per cent.

In doing a complete hysterectomy we are in the habit of associating with it a higher morbidity and higher mortality, and I think that is still true. If we are going to do complete hysterectomies our mortality will be increased. I had a case today and while I was operating I was debating in my own mind whether to do a complete hysterectomy or not, but inasmuch as the pelvic floor was pretty well fixed by an inflammatory condition I felt if I did a complete hysterectomy I probably would jeopardize the patient's chances for recovery.

In looking over one of my charts I find that in 5 cases of complete hysterectomy and in 43 cases of supravaginal hysterectomy the time consumed in the operation was less than one hour. If one can do a complete hysterectomy in less than an hour perhaps the time element in the operation is not such a great factor as it was thought to be. Even in those cases where the operation lasted an hour and a half the difference in time between a complete and a supravaginal hysterectomy was only 6½ per cent longer for the complete hysterectomy. We have a bacterial flora in the vagina which we have to deal with in complete hysterectomy and the morbidity and mortality depend upon that and subsequent infection rather than the time element.

I was impressed with Dr. Kennedy's technic. Utilizing the uterosacral ligament for the closure of the pelvic diaphragm is very important. We all close the vaginal wall as he does, but do not utilize the various structures coming off the uterosacral ligaments where an enterocele is very likely to start.

DR. F. C. HOLDEN.—I disagree with the speaker on the indications for complete hysterectomy.

I also feel that in the hands of most men that the increased time of operation means increased chance of hemorrhage, increased chance of injury to the ureter, increased opportunity for infection, plus, in nonparous women, the shortening of the vagina that goes with it, something which is very frequently overlooked in doing a complete hysterectomy and bilateral oophorectomy in nonparous women.

I notice he did this operation in 79 cases of myoma, in cases of fibrosis which we would treat perhaps with x-ray. With the use of the cautery and diathermy

on the cervix preoperatively, we feel that the indications for complete hysterectomy are very likely diminishing inasmuch as we do not do any more complete hysterectomies for carcinoma of the cervix.

DR. KENNEDY (closing).—In answer to Dr. Ward's question: Does this technic give a better support after operation than other methods? In my hands it gives a very much better support and a very much better vaginal vault.

In regard to Dr. Rawls's remarks about cystocele, I have done three cases of cystocele in patients who have had a fairly good pelvic floor and have been rather pleased with the way the anterior vaginal vault stays up following this technic. However, I cannot report on any number of cases.

In relation to the time of operation: my time in this series has been very varied, the shortest being forty-three minutes and the longest two hours and fifty-five minutes, depending on the amount of work required.

I did not bring the subject of infection following this technic up in the paper, but it seems to me that in cutting across an infected cervix there is more liability to distribution of an infection than there is by cutting across a vaginal vault which has been iodinized. In all these cases we thoroughly iodinize the vagina and as far as I have seen there has not been any more morbidity from this procedure than from supravaginal hysterectomy.

Regarding Dr. Grad's point of view, I would say that as far as morbidity goes, I have made quite a study in a large number of cases and at the present time am going over a series of about 500 cases. There seems to be very little difference in morbidity between supravaginal and complete hysterectomy.

In respect to the indications for complete removal of the uterus, I would state that many of these patients had symptoms of bleeding, with hypertrophied cystic cervices which had been treated and it seemed to me, looking over the situation and summing it up, that the procedure of the removal of the cervix at the time or near the time of menopause was a better procedure in the cases that came under my care than the supravaginal technic.

PHILADELPHIA OBSTETRICAL SOCIETY

MEETING OF JANUARY 2, 1930

DR. STEPHEN E. TRACY reported **An Interesting Observation on What Happened in One Case After an Interposition Operation for the Cure of Cystocele.**

During recent years, the interposition operation has been extensively used for the cure of cystocele and some cases of prolapse of the uterus. It is an excellent procedure in certain well selected cases. That it is followed by a rather large percentage of failures is well known.

Not until recently did we have the opportunity to note from within the peritoneal cavity how the organs adjust themselves to the changed positions. It is on that observation that this report is made.

Mrs. F., aged fifty-seven years, was the mother of one child, delivered by forceps twenty-six years ago.

One year after delivery she was operated upon for the repair of lacerations and the correction of a retrodisplacement of the uterus. The operation was unsatisfactory as she obtained no relief from her symptoms.

Menopause took place at the age of fifty years.

When she came under observation she complained of a distress in the pelvis and of a bearing down sensation, and stated that something descended.

Examination showed a relaxed perineum with an unusual amount of scar tissue. There was a well-marked cystocele. The uterus was small and retrodisplaced, but there was no descensus. The cervix uteri was normal.

On February 12, 1929, she was operated upon and the uterus was brought down into the vagina in front of the bladder. The bladder peritoneum was sutured to the posterior wall of the uterus at the level of the internal os. The fundus uteri was anchored under the subpubic ligament by two chromic catgut sutures. The vaginal walls were resected and then sutured with interrupted catgut sutures each of which caught up fibers of the anterior wall of the uterus. The scar tissue was dissected out and with much difficulty a fair perineum was constructed. The patient had a normal convalescence and was discharged from the hospital in good condition.

She came to the office six weeks later and stated that something had happened as she was uncomfortable and could feel a hard lump just within the vulva.

Examination showed that the cervix uteri was near the vulva. The body of the uterus was freely movable and at no place attached to the anterior vaginal wall. There was no cystocele.

It was suggested that a small pessary be inserted. She rejected the proposition and insisted on further operative treatment and returned to the hospital in April for operation.

When the abdomen was opened it was supposed the bladder would be found posterior to the uterus, but such was not the case. As the uterus had descended, the bladder had traveled up over the fundus and was in normal position, anterior to the uterus.

DR. J. O. ARNOLD presented a report of a case of **Abdominal Pregnancy Two Months Past Term.**

This patient was brought to the Maternity Clinic of the Temple University Hospital by the doctor who had been called in when she thought she was going into labor, some two months before.

Her history may be summarized as follows: a colored woman, thirty-nine years old, in her fifth pregnancy, having had four normal pregnancies and normal deliveries, with four living children, the oldest nineteen and the youngest nine. Always had good health and able to work hard at domestic employment.

Her last regular menstruation was some time in November, 1928, with slight irregular bleeding for several months afterward, and some "morning sickness" occasionally for several months.

She felt life some time in April, and was able to continue her work as usual until July, when she gradually became incapacitated because of abdominal distress and pain located chiefly in the lower left side. By the eighth month she was compelled to give up work entirely. Confinement was expected about the middle of September, and on September 18 she had what she thought was rupture of the membranes, with a show of blood and vague, irregular pains in the abdomen, which she supposed to be the onset of labor. These pains continued with decreasing severity for about twelve hours. A physician was called for the first time, at the beginning of this supposed labor and found what appeared to be a normal, full-term pregnancy, with a large child whose movements were easily noted, and heart sounds distinctly heard. On a second visit, after the pains had ceased, no heart sounds or fetal movements could be discovered and repeated examinations in the next few weeks were likewise negative as to signs of life, as well as to any further indications of labor. A small hard tumor, the size of a fist was found in the lower right quadrant of the abdomen, in front of the fetal mass, and the patient stated in explanation of this tumor, that some years before she had been examined and told she had a "growth of the womb."

After two months without further signs of life or labor, she was brought to the hospital (November 20, 1929).

Having seen a similar case many years ago, a diagnosis of abdominal pregnancy was readily made in this instance, as in the former case, by the very simple expedient of manipulating and observing for a few minutes the supposed fibroid tumor in the lower abdomen. I call attention to this point because in the two cases I have seen, and in four out of six cases more recently reported in the journals, there had been a diagnosis of fibroid tumor complicating normal pregnancy while the real condition remained unrecognized by the first physician called.

It was soon found that this tumor was contractile and was not fibroid, but was the uterus. But the patient had had four uneventful deliveries without disclosing anything abnormal, and therefore an anomalous uterus was hardly probable. Still, the fact that the sack surrounding the child seemed not unlike the walls of a distended uterus, and could even be made by manipulation to show some contractions, was undoubtedly somewhat disconcerting. To offset this, however, were the very typical contractions and relaxations of the small tumor, the uterus and, in addition, one could palpate what appeared to be the round ligament, and other ligamentous bands running off from the left cornu of the uterus into the abdominal sack. The small tumor was also movable to a considerable degree, independent of the larger mass. Vaginally, one could easily identify the portio vaginalis as a part of the smaller abdominal tumor. The placenta extended over the inlet on the left side. There was slight vaginal bleeding which the patient stated had been more marked at times, but never profuse.

A skiagraph made at this time confirmed the diagnosis of breech presentation and also of a dead baby, as could be readily inferred from the marked overlapping of the skull bones. Operation, November 21, 1929. Upon opening the abdomen, under ethylene anesthesia, the above findings were at once verified. The small tumor was found to be a normal uterus enlarged to about the size of a two months' pregnancy.

The abdominal sack containing the fetus was rather thick and strong and had its base or origin in the region of the left broad ligament, extending into the pelvic cavity. It was entirely free from adhesions or attachments at any other points.

When the bag was incised, a thick foul, brownish fluid escaped and a large child, weighing almost nine pounds, was found in an advanced state of decomposition. It was deemed inadvisable to attempt to remove the placenta because of its location. The sack was packed with gauze, and its margins sutured to the lower portion of the abdominal wound, which was left open.

The operation took but a few minutes and there was no more bleeding than in a normal delivery.

The patient's condition remained good until she was removed from the operating table, when she suddenly went into profound shock, became pulseless, and died in about two hours. Autopsy, unfortunately, was not permitted. No blood was found in the abdomen except that contained in the gauze packing and dressings.

I am at a loss to know why this patient so suddenly collapsed. She had had no elevation of temperature, but did have a somewhat subnormal blood count, 3,200,000 red cells, 5,000 whites, and only 54 per cent hemoglobin. It is possible that we operated inopportunely, at a time when she was going through a period of greatly lowered resistance because of a toxemia from the disintegrating chi'd. Operation a few weeks earlier before this period set in, or as the history of some of these cases seems to suggest, considerably later, when the patient had passed through and recovered from whatever toxemia she suffered, might have been attended with better results.

DR. CHARLES A. BEHNEY reported two cases of **Acute Sigmoid Diverticulitis.**

CASE 1.—Mrs. L. D., white, aged twenty-two, was admitted to the Gynecologic Service of the Chestnut Hill Hospital, September 22, 1929, complaining of frequently recurring dull pains in the lower left abdominal region, radiating to the left thigh and back. This symptom had first made its appearance shortly after a miscarriage in August, 1928. There was moderate constipation and abdominal discomfort described as "gas pains." Nocturia (2-3 times) and frequency had been present for one month at the time of admission.

The past history revealed nothing bearing upon the present condition, and nothing suggesting disease of any major system. Dilatation and cauterization of the cervix had been performed five years previously for leucorrhea. The patient's two pregnancies had both ended in miscarriages, the second of these occurring four months before admission. The menstrual history was in no way abnormal.

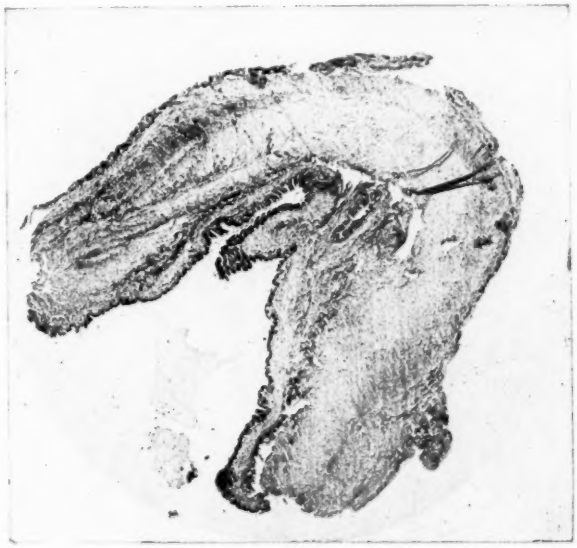


Fig. 1.—Low power.

The patient was rather obese and, at the time of examination, seemed in no pain. There were a number of carious teeth and palpable cervical glands. The chest was emphysematous but the heart normal. Thickness of the abdominal wall rendered abdominal examination difficult; no masses were palpable, but there was definite tenderness in the left ovarian region. The cervix was slightly lacerated, the fundus of the uterus was retroflexed. The right adnexa could not be palpated, while in the region of the left ovary an exquisitely tender and firm, but not adherent mass was noted, which felt like an elongated ovary.

Blood Count: Erythrocytes, 3,850,000; leucocytes, 6,600; hemoglobin, 78 per cent; sedimentation time, ninety minutes; Wassermann reaction, negative; urinalysis, normal.

An exploratory laparotomy and suspension of the uterus were decided upon. At operation the adnexa were found to be normal. Almost touching the left ovary there was found a structure that looked like an acutely inflamed epiploic appendage, springing from the midportion of the sigmoid. This was excised and the stump inverted. A Coffey suspension and routine appendectomy were done. The

incision healed by first intention and, after a normal convalescence, the patient was discharged in good condition eighteen days after operation.

Pathologic Diagnosis.—The specimen was a small tumor, 1.5 x 1.5 x 2.0 cm. On section, it resembled an inflamed epiploic appendage.

Microscopic: The general architectural arrangement was suggestive of a hollow viscus lined with mucosal folds, the stroma of which was an extension from the muscularis. One-half of the specimen was necrotic, so much so that the tissue structure was not recognizable. The remaining portion showed mucosal folds, with unusually large and swollen epithelial elements. The cytoplasm appeared necrotic in places but the nuclei were normal. The basement membrane was present in normal relation. Epithelial desquamation was pronounced, with an occasional crypt (or what appeared to be one) seen in cross-section. The necrotic material had undergone a fatty caseous change, and large fat droplets were evident in some of the epithelial cells. Areas of moderate fibrosis were present

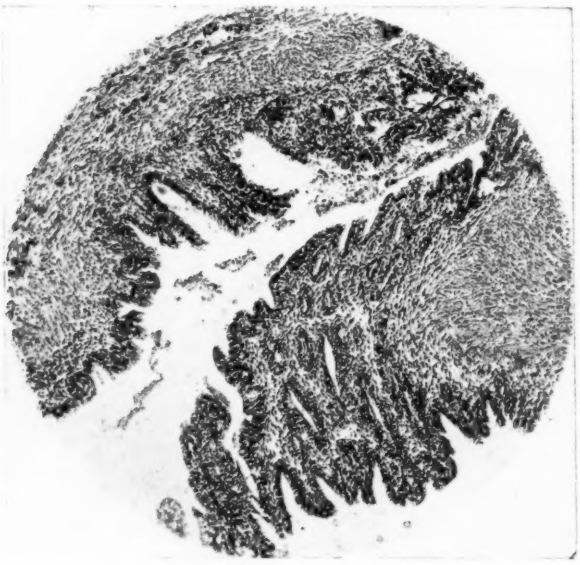


Fig. 2.—High power.

showing hyaline or more advanced degenerative changes. There was a moderate mixed polymorpho- and mononuclear infiltration. Red blood cells were easily found scattered throughout the section.

Evidently, this was a case of necrotic degeneration of a diverticulum of the intestine, apparently the end-result of a chronic condition, although at one time considerable exudate must have been present in the lumen.

Diagnosis.—Diverticulitis.

CASE 2.—Woman, white, aged forty, was admitted to the Gynecologic Service of the University Hospital, February 8, 1929, at 10:15 P.M., complaining of pain in the lower right abdominal region. Three days previously she developed a lower right abdominal pain, becoming localized at McBurney's point. Since then the pain had persisted and she had vomited several times. Her bowels were regular. There were no urinary symptoms.

There had been a similar but more severe attack three years before, and her periods had been somewhat irregular from then on.

On admission, the temperature was 98.2° F., the pulse 92, and respirations 20.

The patient was a rather poorly nourished adult female, apparently fairly comfortable. There was marked right rectus rigidity, with exquisite tenderness over McBurney's point. The pelvic examination showed nothing abnormal, except a smooth hard mass the size of an orange, apparently springing from the left side of the fundus, the uterus moving with the tumor.

Blood Count: Erythrocytes, 4,100,000; leucocytes, 11,900; hemoglobin, 80 per cent. Urine normal.

A diagnosis of acute appendicitis and subperitoneal myoma was made, and an immediate abdominal section decided upon.

At 1:35 A.M., a midline incision was made, which exposed a dermoid cyst of the left ovary, adherent to the left cornu of the uterus. The appendix could not be found in its normal position nor the cecum felt in the right iliac fossa. In its place was discovered the sigmoid, attached to which was found an enlarged gangrenous epiploic appendage, adherent to another epiploic appendage which was normal in size but acutely inflamed. These were both ligated and removed and the dermoid cyst excised. The cecum and normal appendix were located in the left iliac fossa, and a routine appendectomy performed. The gall bladder, liver, and pylorus were found in the upper left abdominal region, while the spleen was felt on the right side, a complete situs inversus abdominis. Before closure, the heart was felt through the diaphragm on the right side of the thorax.

Examination by Dr. Cooper verified these thoracic findings.

Gastrointestinal x-ray examination by Dr. Pancoast showed transposition of stomach, duodenum, and colon.

Electrocardiographic examination by Dr. Wolferth: P-waves inverted. P-R intervals, 0.14 second. QRS complexes inverted in Lead I. T-waves inverted in Lead I.

Tracing showed dextrocardia, with inversion of all waves in Lead I, and Leads II and III transposed. No evidence of cardiac disease.

Pathologic Diagnosis.—Teratoma cystica ovarii; diverticulum; enlarged gangrenous epiploic appendage.

After an uneventful convalescence, this patient was discharged in good condition twenty-two days after operation, and has been symptom-free up to the present time.

While many cases of complete situs inversus are on record and numerous references have been made to its association with acute left-sided appendicitis, we have been unable to find any report on this condition complicated by acute diverticulitis of the sigmoid simulating acute right-sided appendicitis. The fact that the complete transposition of the viscera (and especially the dextrocardia) was completely overlooked in the preoperative examination by the ward intern, indicates the great care which general physical examination deserves, even before emergency operations.

In both of these patients, operation was undertaken for the correction of commonplace abdominal lesions, namely, ovarian tumor and acute appendicitis. On exploration of the peritoneal cavity, however, a relatively uncommon condition, acute diverticulitis, was discovered in each instance. It appears reasonable that this lesion might occur more frequently than is generally believed and it should, therefore, always be looked for when operations for diseases of the pelvic viscera, (sepecially those of the left side) fail to reveal the anticipated pathologic condition.

DR. ARTHUR FIRST AND DR. LEOPOLD GOLDSTEIN presented a paper entitled **Anemia in Pregnancy.** (For original article see page 70.)

DISCUSSION

DR. P. B. BLAND.—I wonder whether the investigations outlined in recent contributions to the literature have not been carried on to settle once and for all the many conflicting statements in our textbooks regarding this question, for the opinions

expressed in modern obstetric textbooks vary widely. No two seem to be alike, and I imagine this is due probably not to personal investigation carried on by an individual writer, but rather to the incorporation of opinions expressed by others.

As a student I gathered the impression that pregnancy was almost invariably associated with an unusual richness of the blood. Until quite recently it was generally assumed and taught that there occurred in pregnancy an increase both in the quantity and quality of this vital element. The change was and still is customarily described as "the plethora of pregnancy," and it seemed to be taken more or less for granted that in nearly every pregnant individual, not only was there an increase in the watery constituent of the blood, but in all others as well.

According to recent studies, this assumption appears to lack foundation.

For many years I have been impressed, also, by the observation that not all pregnant women present the ruddy glow of health. On the contrary, I have found a large percentage who displayed, not a picture of ruggedness, but definite systemic signs of a slight or moderate degree of anemia.

DR. LEOPOLD GOLDSTEIN.—In a previons study on this subject, the results of examinations of 100 private maternity patients were compared with those of the ward patients, in order to determine if environment and living conditions may have any bearing on the incidence of anemia in pregnancy. Since all of the private patients were examined at term, only those ward patients who had counts taken at term were selected for this comparison. The red cell counts and hemoglobin estimations of 179 ward patients were available for study.

It was found that about 62 per cent of the private patients had a hemoglobin percentage of less than 75, as compared with over 80 per cent of the ward patients. Over 40 per cent of the private patients gave normal counts, as compared with only 14 per cent of the ward patients. The percentage of ward patients having under 3.5 million cells at term (52 per cent) was twice as great as that of private patients (26 per cent).

The fact that so many private patients as well as ward patients were affected suggests that factors concerned directly with the pregnant state may have been responsible for the anemia. The influence of better environment and living conditions, however, may account for the lower percentage of private patients manifesting anemia.

BROOKLYN GYNECOLOGICAL SOCIETY

MEETING OF FEBRUARY 7, 1930

DR. M. ROSENBERG presented a report of a case of **Primary Broad Ligament Fibromyoma with Sarcomatous Degeneration.**

Patient M. L., aged thirty-seven, married, obese, not acutely ill, was admitted to the private service of Dr. Leo S. Schwartz at the Jewish Hospital of Brooklyn on October 21, 1929, complaining of difficult and frequent urination.

Patient was married thirteen years and had two children, the eldest being eleven years and the youngest five years (latter delivered by high forceps). The existence of a pelvic tumor was known during this last labor. Menstrual history normal. Last period October 6, 1929.

Although patient was aware of the presence of a pelvic tumor, no symptoms appeared until about four months prior to admission to hospital, when she experienced difficulty in urination and, although the desire was frequent, she was unable to void. This was soon accompanied by dysuria, the condition becoming progressively worse, as she was only able to void in drops after initiating a flow of urine. There was no hematuria at any time.

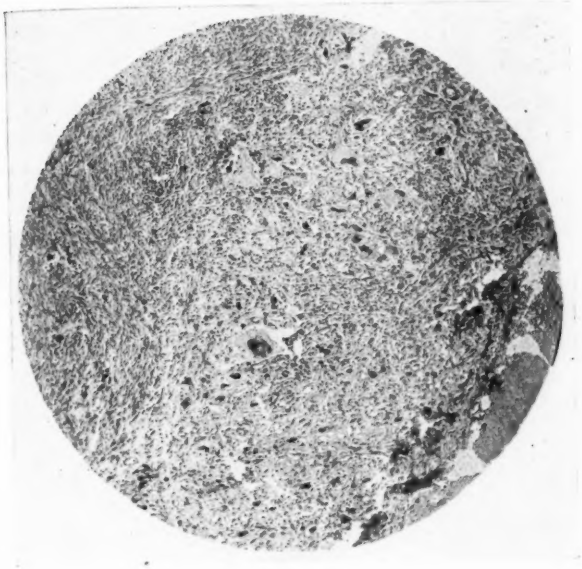


Fig. 1.

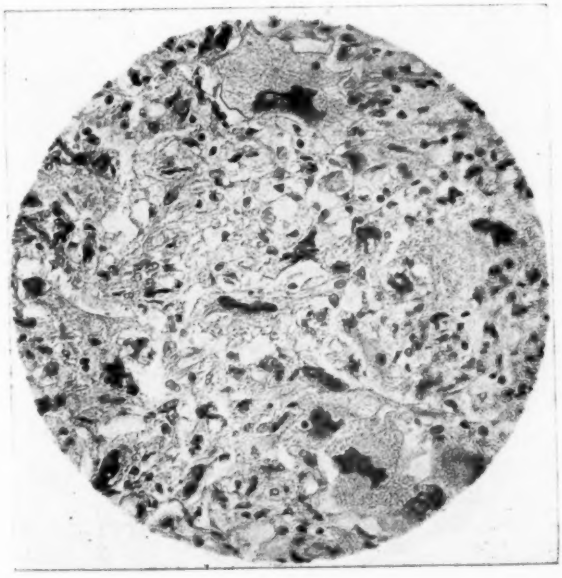


Fig. 2.

Examination disclosed an insensitive mass in the median line above the symphysis.

A large, hard, movable mass occupied the entire culdesac, descending almost to the introitus. The parous lacerated cervix was pushed up behind and above the symphysis. The uterus was small, pushed up high by a mass as previously described which appeared to be about the size of a large grapefruit. Adnexa not felt. Preoperative diagnosis: Intraligamentous fibromyoma.

Laboratory data: Urine normal; blood pressure 135/85; red blood cells 4,400,000, hemoglobin 90 per cent, white blood cells 9,000, polys 62 per cent, lymphocytes 37 per cent, mononuclears 1 per cent.

Operation.—Spinal anesthesia, paramedian incision.

Exploration showed a small uterus with several small fibroid nodules; both tubes and ovaries apparently normal; adhesions of sigmoid to left broad ligament; large tumor mass occupying the pelvis, encroaching upon the bladder and rectum; appendix long and nonpathologic. A supracervical hysterosalpingo-oophorectomy was done first, in order to make possible an approach to the tumor. This was followed by difficult enucleation of a left intraligamentous fibroid which extended into the right broad ligament; resection of part of capsule and suturing of capsule stump. Abdomen was closed in the usual manner.

Patient made an uneventful recovery and was discharged on the fourteenth day free from symptoms.

On discharge the general condition was good, abdominal wound healed by primary union; parous pelvic floor; lacerated cervical stump; pouchiness in posterior fornix; lateral fornices free.

Postoperative follow-up examination six weeks later by Doctor Schwartz revealed that the infiltration in the posterior fornix was resorbed and the cervical stump freely movable. In view of the pathologic findings the patient is at present receiving deep radiotherapy.

Pathologic Findings.—Specimen consisted of uterus, both tubes and ovaries, a large nodular firm gray intraligamentous tumor mass.

The uterus measured 7 cm. long, 6 cm. transversely, and 3 cm. in thickness and contained several subserous and intramural gray masses. The wall was 2.5 cm. thick and the endometrium 4 mm. in thickness, covered with blood clot at numerous points. The tubes were normal. In the ovaries were numerous cysts containing clear fluid.

The intraligamentous tumor mass measured about 8 cm. in diameter, 12.5 cm. long, nodular and grayish yellow in color, firm in consistency, and on section showed several areas of softening with brown yellow discoloration.

Microscopic examination of the masses in the uterine wall showed whorls of fibromyomatous structure. There was no evidence of malignant degeneration in any of these subserous and intramural nodules. The endometrium showed glandular hyperplasia. The ovaries were the seat of several follicular cysts.

The intraligamentous tumor mass was made up of spindle cells with interlacing bundles of fibrous tissue. The degenerative areas showed a spindle-cell sarcomatous degeneration with numerous giant cells within the area of degenerated sarcoma.

This case, I believe, demonstrates an independent broad ligament fibromyoma that has undergone sarcomatous degeneration.

Dr. E. V. Littauer presented a report of a case of **Hydatidiform Mole with a Viable Fetus.**

Mrs. R. T., aged twenty-six, admitted to the service of Dr. Schwartz in the Jewish Hospital on October 3, 1929. Discharged December 1, 1929. Her chief complaints were vaginal bleeding, vomiting, chronic cough, dyspnea, palpitation. Family history negative and irrelevant. The patient had had typhus fever at

twelve. Following the delivery of her first baby three years ago, patient developed rheumatic fever and has suffered with cardiac trouble ever since. A tonsillectomy was done two years ago. Last menstrual period June 11, 1929.

Since her last menstrual period, approximately four months previous to admission, patient began to complain of dyspnea, palpitation, and precordial pains. She also noticed that she stained slightly every two to three days. This caused no concern until three days previous to admission, when she suddenly experienced a rather brisk hemorrhage.

Physical examination showed mitral stenosis and regurgitation, auricular fibrillation, and cardiac decompensation.

A uterine mass could be palpated in the lower abdomen, extending from the pelvis to within four fingers' breadth of the umbilicus. It was smooth, symmetrical and freely movable. No other masses were felt. Fetal heart not heard. Bimanual examination showed the uterus enlarged to the size of a four months' pregnancy, soft and freely movable. No bleeding noted.

Conservative treatment was instituted in order to improve the cardiac status sufficiently so as to enable us to interrupt the pregnancy. Laparotomy with sterilization was the procedure that was decided upon.

On October 17, that is, fourteen days after admission, under local anesthesia, a hysterotomy and bilateral sterilization were performed. The uterine contents consisted of the following: A perfectly normal fetus, 14 cm. long, with digits and genitalia well defined, some apparently normal placental tissue and a mass of grape-like tissue which, microscopically, was made up of degenerated villi which were undergoing enlargement and cyst formation. Syncitial tissue masses surrounded many of these degenerating villi. The ovaries were normal in size and showed no evidence of cyst formation.

We might here be confronted with the following problem: Was this a twin pregnancy in which one had undergone hydatidiform degeneration, while the other was to have developed into a full-term normal fetus? Or was it a single pregnancy with hydatidiform changes in the placenta which were not interfering with the development of the fetus? I am of the opinion that this was a single pregnancy with very marked and extensive macroscopic hydatidiform changes in the placenta. I could find no case in the literature that described such marked gross changes in the placenta in the presence of an apparently normal fetus.

DISCUSSION

DR. SAMUEL A. WOLFE.—My experience with the pathologic examination of hydatidiform moles of this particular type consists of a specimen removed about three years ago at the Long Island College Hospital. In that instance there was a definite case of twin pregnancy with a hydatidiform degeneration in one ovum and a normal placenta and viable fetus in the second ovum.

It is interesting to note particularly the relation of hydatidiform mole to chorioearcinoma. For example, in Veit's *Hand Book* in a discussion of the etiology of choriocarcinoma, Veit definitely states that it is his firm belief that in every case of choriocarcinoma there has been an antecedent hydatidiform mole, in most instances microscopic in type and not grossly recognizable.

DR. I. C. RUBIN read a paper (by invitation) entitled **Tubal Strictures and Their Localization by Uterotubal Insufflation and the Kymograph.** (For original article see page 28.)

DISCUSSION

DR. J. EARL MILES.—I have put patients who apparently had normal tubes through the gamut of carbon dioxide insufflation before and during laparotomy. These were cases of chronic appendicitis, the patients granted me the privilege of

using an instrument to test the patency of their tubes. The instrument I used lately was one of my own design.

There was no appreciable change in the pressure necessary to insufflate the tubes before or during the ether anesthesia.

DR. RUBIN (closing).—In studying the question of pain in cases with stenosed or occluded tubes, I have often noted just at what point measured in millimeters of mercury the patient said she began to feel the pain. In most cases they begin to complain of pain at about 120 or 140, just as Dr. Cary found.

The slower, the more careful, the more gentle one is in doing an examination, the more certain one is to get accurate data. There is no doubt that brusque handling of the uterus provokes spasm. The factor Dr. Duncan called attention to, namely, the rate of the flow, may also be measured in terms of quantity of flow and time as well as in pressure and flow, which amounts to practically the same thing.

The main caution is against too much speed. I remember an experience that the late Dr. Studdiford had when he first did insufflations. He was doing a laparotomy with the cannula in the uterus. An oxygen tank was used as the source of supply for the gas, an old-fashioned tank with a loose handle. One of the spectators in great anxiety to see what was going on at the laparotomy, brushed by and forced a terrific amount of gas to flow into the uterus. The tubes ruptured with explosive force. Fortunately they were under direct vision in the abdomen and no harm resulted. Now, of course, that is an avoidable accident. It did no harm in that particular case, but it could do great harm under other circumstances.

Three fatalities which have come to my notice were reported by me, as well as by Dr. Moench, in women who were subjected to this test for sterility. One of them had myocardial disease and diabetes. In all three cases the doctor carrying out the test was doing it without any attempt to acquaint himself thoroughly with the technic and the presence of contraindications.

Too much emphasis cannot be given to the question of when the test may not be done. The indications can be summed up briefly: Its specific use is in sterility cases, to establish the fact of patency or nonpatency, and that is all. I never perform uterotubal insufflation in the presence of pelvic tenderness, no matter how slight. There is no reason for haste in a case of sterility of two, three, five or six years' standing. One can postpone the test for six months if necessary, awaiting the time when all tenderness and all contraindications are gone. Of course, endocervicitis is a very decided contraindication and requires treatment preliminary to the test.

In the beginning I subjected the patients to bacterial examinations and to the sedimentation time test, taking the temperature for twenty-four hours after pelvic examination and then examined the patient again for tenderness. The experienced gynecologist does not need to resort to these routine laboratory examinations in the presence of a clean cervix with no purulent secretion or palpable mass, and in the absence of tenderness.

There are cases where the pressure reaches 160 or 180 mm. Hg. and then drops. The patient gets no shoulder symptoms. If one examines the patient immediately after, he may detect a flaccid, distended tube on one side that he did not feel before. In extirpated specimens I have demonstrated that sometimes as much as 100 c.c. can be introduced into a dilated tube which clinically may have caused no symptoms whatsoever.

In some cases in spite of a fall in pressure there are no positive auscultatory signs, no shoulder pains. But fifteen or twenty minutes after the examination the patient may say she has pain in one shoulder; when you fluoroscope her you find

she has an air meniscus under the diaphragm. This points to the presence in the pelvis of adhesions which captivate the gas for a while and from which it liberates itself a little later rising to the diaphragm.

That leads me to another point that Dr. Duncan raised. He said he saw free air under the diaphragm by fluoroscope and yet the tubes were closed. You must be careful to determine whether the air is on the left side or on the right side. An air bubble is almost constantly present in the stomach and may be confusing. When the gas is on the right side it is absolutely pathognomonic. In case of doubt when the gas is on the left side and is scanty in amount I place the patient on the left side and make pressure on the right costal margin which forces the gas to the right side. By fluoroscopy you can then see a meniscus of gas under the diaphragm on the right side.

The method of introducing water into the vagina as Dr. Furniss first recommended, with the patient in the tilted position, is very useful. I have not felt the need of that because with the ear rather close to the vagina one cannot fail to detect cervical regurgitation. When one is not experienced in distinguishing cervical leaks, this is perhaps a wise thing to do.

In the majority of cases I think it suffices simply to hold the rubber acorn very firmly in the cervix against the bullet forceps which grasps the anterior cervical lip. I do not feel that the self-retaining instruments which are devised for absolute air-tightness of the cervix need be used.

Dr. Cary stated that with his fingers he can feel certain differences in pressure. There is no doubt but that with increasing experience one can distinguish between various pressures, but still if you test it against a kymograph and see the kind of curves you get, you will be surprised. With the kymograph and a uniform pressure and rate flow, you can make more accurate observations and interpretations. I prefer not to rely upon my subjective sensations.

Dr. Miles referred to strictures being found at laparotomy. Passing a Pollitzer bulb through the fimbriated end will demonstrate the nearest stricture. If this is impassable the other intrinsic strictures can only be guessed at. Insufflating through the uterus with the cannula in situ can show the stricture nearest the uterine ostium.

CHICAGO GYNECOLOGICAL SOCIETY

MEETING OF JANUARY 17, 1930

DR. F. LEE STONE presented an **Instrument for Determining Tubal Patency**, which was described in the January, 1930, issue of this JOURNAL.

DR. A. F. LASH presented a specimen of **Ectopic Corpus Luteum Associated with Ruptured Tubal Pregnancy.**

This specimen was obtained from a white woman thirty-eight years of age who was admitted to the County Hospital with a clinical picture of ruptured ectopic pregnancy. The specimen was presented as a pathologic rarity, if one were to accept what recent investigators (Dolgopol) say about ectopic corpus luteum, in that there are only twenty-four such reports in the literature up to 1920.

DR. NORBERT ENZER, of Milwaukee, reported a case of **Endometrioma of the Umbilicus.**

A tumor of the umbilicus was removed from a girl 18 years of age. The tumor had been present for six months and was not painful. A few days before the

removal it discharged some blood, which was ten days after the last menstrual period. The tumor was a nodular growth with an apparently intact skin surface. The cut section showed a diffuse fatty and connective tissue tumor.

Microscopic section revealed a thin layer of squamous epithelium, with the main portion of the tumor made up of connective tissue cells and smooth muscle fibers. Imbedded in these were numerous glands lined by columnar epithelium, some of them quite small, others dilated, occasionally single but more often multiple. They were surrounded by a dense cellular stroma, many of them containing blood and being surrounded by blood. Desquamated epithelium was occasionally present. The peritoneal surface of the tumor was particularly interesting because of a deep indentation, sections through which revealed numerous prolongations of the peritoneum into the tumor and several gland structures which could be traced directly to the peritoneum. These latter were lined by low cuboidal epithelium of the goblet type, surrounded by loose connective tissue stroma.

The appearance of the glands, the stroma, the hemorrhage, the connective tissue led to a diagnosis of endometrioma.

There were several points of interest in this tumor. The patient was younger than any that were encountered in the literature. The finding of glands directly continuous with the peritoneum strongly supported the serosal origin of these endometriomas. The presence of the gland lined by mucus-secreting cells lends some support to the origin of this tumor being from the omphalomesenteric duct. The smooth muscle was likewise of importance. If one interprets an endometrioma on the basis of Sampson's theory, it is a little difficult to understand how smooth muscle occurred in these tumors. At the umbilicus there was an embryologic basis for the occurrence of smooth muscle. This case will be published later in more detail, with a survey of the literature.

DISCUSSION

DR. SIDNEY SCHOCHET.—I believe more firmly than ever Sampson's view that endometrium arises from the mullerian tissues. The only way we will be able to prove definitely that these endometriomas are similar in character to endometrium would be to get a very fresh specimen, have it properly fixed and study the cells. In other words, the growth morphology is no criterion as to whether it is an endometrioma.

DR. CAREY CULBERTSON.—While this tumor of the umbilicus was a glandular type, it is a mixed one. Even though it may be shown that some of the glands are endometrial in type, there are others that are different, in part like an adenomyoma. Aside from this difference, I agree with Dr. Schochet that it will require further cytologic study to prove that even some of those glands are endometrial in origin.

DR. E. D. PLASS, OF IOWA CITY, IOWA, (by invitation) read a paper on **Trichomonas,** which was discussed by Drs. Cron, Reis, Lash, Parsons, Evans, and Davis.

DRS. CARL H. DAVIS AND G. W. STEVENS presented a paper entitled **Value of Routine Radiographic Examinations of the Newborn, with a Study of 702 Consecutive Cases.** (For original article see page 73.)

DISCUSSION

DR. A. H. PARMELEE.—During the last few years at the Cook County Hospital, we have studied many newborn infants with the x-ray. Our particular study was in regard to congenital syphilis but a lot of interesting things have

arisen in taking these pictures of babies for congenital syphilis. We have taken pictures of the whole body as a rule. A great many of Dr. Davis' babies showed apparently very large thymus shadow and apparently very large hearts. Of course, one has to be careful in the interpretation of x-ray pictures of an infant with regard to the size of the heart and the size of the thymus, because of the variability of conditions at the time the picture was taken. For instance, in several of these pictures I have looked at tonight where the thymus and heart shadows were very wide, the diaphragm is very high and consequently that modifies the picture. We must interpret these pictures depending on the location of the diaphragm when the picture was taken. Naturally symptoms come from an enlarged thymus but there are a lot of babies who have a wide mediastinal shadow which appears to be an enlarged thymus with no symptoms, as Dr. Davis has said. I believe it would be unnecessary and unwise to give x-ray treatments to those children unless there was some very definite reason from the standpoint of symptoms. I am absolutely convinced from our studies of congenital syphilitic infants and infants of mothers with congenital syphilis, that with x-ray examination of the newborn we have probably the most important evidence in the diagnosis of congenital syphilis. Wassermann and Kahn reactions are notably apt to be absent in the first few weeks of life and in the first few months, perhaps. Syphilitic osteochondritis may be the first thing found. One of the things that struck me as particularly interesting was that there were six cases that had apparently spontaneous pneumothorax. I have observed one or two in the last couple of years. One in particular was in an extreme state of dyspnea and had a very marked spontaneous pneumothorax, probably from the blocking of a bronchus and the lack of aeration on one side and a pulling away of the parietal from the visceral pleura.

DR. FREDERICK H. FALLS.—I would like to ask Dr. Davis if I understood correctly that one per cent of these babies have spontaneous pneumothorax and also if in those cases a tracheal catheter was inserted and artificial respiration performed.

DR. BEN. F. FEINGOLD.—I think that the incidence of enlarged thymus is greatly overestimated. The broad shadow which appears along the margin of the heart and is so frequently diagnosed as enlarged thymus, in most cases is due to a normal dilatation of the great vessels, or a pushing up of the diaphragm by the stomach. It is interesting to notice in Dr. Davis' paper that a number of cases which were clinically diagnosed enlarged thymus upon roentgenologic findings, showed, when autopsied, other factors, as congenital heart disease and especially cerebral hemorrhage as the cause of death. I had the privilege about a year ago of doing autopsies on a large series of newborn children. Of this group many had a clinical diagnosis of enlarged thymus, but autopsy showed either cerebral hemorrhage or atelectasis as the cause of death. In these cases the thymus varied in size from about 8 to 20 gm. It is interesting that even in those cases having a thymus weighing about 20 gm. there was no history of a thymic syndrome. In our experience at the Lying-In Hospital during the past year, with about 1,500 newborns, we have not had a single case of so-called enlarged thymus clinically.

DR. RUDOLPH W. HOLMES.—I have always been led to believe that the thymus of the newborn baby was disproportionately large, and so remained for a period after mature birth; was, in fact, large before birth as it was a necessary organ for normal intrauterine growth—later assuming secondary characteristics and diminishing in size. Also, that all babies were born atelectatic; after respiration had begun aeration was largely confined to the apices and posterior aspects of the lungs; gradually, expansion took place in the remainder of the lungs so

that full respiratory activity was evident after some days. I wonder if these extremely good x-ray pictures are not but demonstrating characteristic normal attributes of the newly born!

Only two babies delivered by me have died of status lymphaticus—and both of these died when some months old. The cause of death was determined by expert pathologists. One was found dead in its crib when taken up by the nurse in the morning. The other was taken out for an airing and, on returning home, the nurse found the baby had died during this period.

I believe there is too much anxiety over the reputed dangers of x-ray to the baby, born and unborn. The first weeks of pregnancy we must believe that actual menace exists, but later the extremely short exposure for a picture, or even a series, is of no moment. I feel that the same holds true of children in infancy. Therefore, I cannot believe that the taking of these pictures jeopardizes the infants.

DR. E. D. PLASS, IOWA CITY, IOWA.—We have not had a single baby come to necropsy when the pathologist has been willing to blame the death upon an enlarged thymus. I have, however, seen one child who at the age of six months presented the clinical and roentgenologic evidence of enlarged thymus, and who responded favorably to x-ray therapy.

DR. DAVIS (closing).—Our percentage of thymus hypertrophy is lower than that usually reported in studies of the newborn. A few years ago nearly all the clinics that were making such studies reported from 39 per cent to as high as 45 per cent of the newborn showing hypertrophy of the thymus.

The question as to whether symptoms are due to the thymus is a matter of judgment and the twenty babies in this series were treated on the order of the pediatrician. We find that one pediatrician will consider certain symptoms as evidence that the thymus is causing trouble, others may not agree. However, a few years ago I had a baby which was apparently in good condition when it left the hospital, but when it was four or five months old the mother found it dead in its crib. A few months later another patient found her baby dead in its crib at the age of three months. Status lymphaticus was given as the cause of death in the second instance. Another child three weeks old, developed symptoms which the pediatrician thought were due to the thymus. Within a few hours after the first x-ray treatment those symptoms began to disappear and with the course of three treatments they entirely disappeared, but without any change in the size of the thymus.

As regards the lung condition, there were six babies who had pneumothorax. This paper is based on a study of the x-ray findings and it is not possible for me to answer the questions Dr. Feingold asked, regarding the resuscitation.

The x-rays were not taken immediately after birth but were made within two or three days when the lungs would normally have expanded. I will agree with Dr. Holmes that if they are made immediately we would undoubtedly find atelectasis in many more of them.

I do believe that in teaching clinics, where there is close cooperation between the departments of obstetrics and of pediatrics, studies of this sort will be very worth while, but instead of making them from only one point of view they should be followed as part of a complete clinical investigation.

Department of Maternal Welfare

CONDUCTED BY FRED L. ADAIR, M.D., CHICAGO, ILL.

STANDARDS FOR MATERNITY CARE*

Prepared by the Committee on Maternity Care of the Children's Welfare Federation and a special committee appointed by the New York Obstetrical Society

The "Standards" herewith presented have been prepared to serve as a basis for judging and evaluating maternity work. They will later be modified according to the criticisms which it is hoped will follow the circulation of this pamphlet. . . .

Preliminary to the preparation of the first draft of these Standards, the maternity work was observed in a selected group of hospitals with varying policies, procedures, and problems.

In the preparation of these Standards, the Committee has kept in mind the following facts:

1. There is a variation in the technic, administrative policies, and physical arrangement of hospitals and clinics, as well as in the facilities of the private practitioner's office.
2. Institutional and private care of obstetric cases overlap in varying degrees.

GENERAL PRINCIPLES

These Standards are presented in the belief that:

1. Certain minimum requirements for the conduct of obstetric cases are applicable with modifications to organizations and individuals engaged in the practice of this branch of medicine.
2. Adequate maternity care for all mothers in any community presupposes the acceptance of such minimum requirements by all institutions, organizations and individuals giving any maternity service.
3. The aim of adequate maternity care is the minimum of mental and physical discomfort for every woman during pregnancy; the maximum of mental and physical fitness at its termination, with the reward of a well baby and the knowledge whereby she may keep herself and her baby well.
4. Standards developed with institutional practices in mind are as a whole adaptable to private practice with certain minor changes and omissions.
5. Every organization and individual giving maternity care, should make a conscientious effort directly or indirectly to teach the community the value of and the need for medical and nursing care from the time pregnancy is suspected.
6. While independent centers giving prenatal care are at times necessary, it is important that such centers have a definite working agreement with hospital services, for the reception of patients and their subsequent treatment.

*For lack of space these "Standards" are presented herewith in an abbreviated form but those interested may obtain a copy of the complete pamphlet by addressing the Children's Welfare Federation, 244 Madison Avenue, New York City. The "Standards" are of course tentative and the Committee which has prepared them is desirous of comments and suggestions for possible incorporation in subsequent editions.

7. It would appear desirable for each community to establish a local committee on Maternity Care, made up of interested professional and lay groups or individuals. This committee should serve as a clearing house for information, should endeavor to develop improved facilities for obstetric care where these are deficient or lacking, and should stimulate the adoption of uniform standards by those engaged in maternity work.

Section I

Prenatal Care

Prenatal Care is the supervision, care, and instruction given to pregnant women. This care should include:

A. A visit to a private physician or clinic as early in pregnancy as possible, at which the following points should be noted:
   1. Personal history.
   2. Menstrual record.
   3. History of present pregnancy with particular reference to the occurrence of nausea, vomiting, vaginal discharge, constipation, urinary disturbances, headaches, etc.
   4. General physical examination.
   5. Arrangement for subsequent visits and care at delivery.
   6. Instruction accompanied by printed advice on hygiene of pregnancy.
   7. Abdominal examination, palpation, auscultation, at and after fifth month.
   8. Blood examination, including hemoglobin, red cell count, Wassermann and Kahn tests, if and where possible.
   9. Urethral and cervical smears, where indicated.

B. Regular visits to the physician or clinic at least once a month during the first seven months, and then every two weeks or oftener as indicated.
   Internal and external pelvimetry after seventh month in all cases.

C. Group teaching in prenatal clinic which will instruct the mother in the care of herself, the preparation for delivery and the care of the baby upon its arrival. . . .

D. Arrangements for referring of clinic patients to other institutions equipped to give the desired care which for any reason cannot be given by the institution or organization first approached.

E. A carefully integrated medical social plan for clinic patients, by developing a contact between the clinic and the patient which will help to solve any social or economic problems which may affect the health and peace of mind of the patient or prevent her following instructions.

F. Home visits by a supervised public health nurse in accordance with the physician's instructions, are desirable both for institutional and private practitioners' patients. . . .
   The nurse's visit is of value only if she sends a report of her findings and advice, on each visit, to the hospital or doctor caring for the patient.
   Where public health nurses are advising patients in the hygiene of pregnancy and those patients are not as yet under supervision of a hospital or a doctor, the nurse should work under standing orders from the Medical Committee. . . .

Section II

Delivery Care

A. General Considerations, for the attending physician or hospital staff:
   1. Every patient in labor should be carefully watched from the beginning until such time after the completion of labor as her condition appears entirely satisfactory.

2. The patient should be kept reasonably quiet.
3. Privacy for the patient during delivery is desirable and should be provided if possible. . . .

B. Hospital Delivery:

Both medical and nursing facilities should be as adequate at night as in the daytime.

Patients admitted in labor should be transported directly to the labor room and not delayed for history taking.

1. Ward Patients,
   a) The resident should be notified when the patient goes into labor, or in hospitals having no resident, the chief of the obstetric service should be notified directly.
   b) The patient should be transferred to a labor room where she should remain until she is ready to be delivered.
   c) A nurse should be assigned to watch the patient during labor; and to give, as far as possible, her undivided attention to the patient and keep the physician informed of the patient's progress and prepare the patient for delivery according to the technic employed by the institution.
   d) The chief of the obstetric service should be responsible for maintaining the medical standards and should be in charge of the delivery service.
      (1) There should be a graduate doctor assigned to conduct each delivery. . . .
   e) There should be adequate nursing service at delivery. . . .

C. Home Delivery.

1. As a result of prenatal instruction there should be a thorough understanding by the patient of the procedure for summoning physician and nurse at the onset of labor.
2. After labor has started, arrangements should be made to keep the patient under constant observation throughout labor.
3. The nurse's responsibility should include:
   a) Making the necessary preparations for delivery early in labor.
   b) Watching the progress of the labor carefully and noting any change in the patient's condition; getting in touch with the physician at regular intervals if the physician should be called away during labor or is otherwise detained.
   c) Urging the patient to bear down only as and when directed by the physician.
4. The physician should,
   a) Make necessary examinations.
   b) Give orders for preparation of patient and "set-up" if patient is in labor.
   c) Instruct the nurse, if it is necessary for him to leave the patient when she is in labor, as to—
      (1) Where he may be reached.
      (2) The name of another physician who is available and should be called if he cannot be reached or has not arrived by the beginning of the second stage of labor.
      (3) What procedure he wishes her to follow if patient delivers before he returns.
5. An attempt should be made to maintain the same standards in home deliveries as are maintained in hospital deliveries.

Section III

After Care

Care of patients after delivery should include careful inspection and supervision and every effort to guard against complications.

A. For Mother:

1. Patient should be kept warm in delivery room for at least one hour after delivery, under careful observation.
2. After being returned to a warm bed, patient should be made comfortable, given a warm drink, and kept under observation.
3. Arrangements should be made for the patient to spend at least 9 or 10 days in bed after delivery. Hospital patients should be kept in the hospital 12 or 13 days and arrangements should be made for patients delivered at home to spend an equal length of time resting in bed, after delivery. . . .
4. Adequate diet of well-cooked, nourishing food. . . .
5. Visits by the physician as often as may be needed, and at least on the first, third, fifth, seventh, and tenth days if patient is at home. . . .
6. Nursing care. . . .
7. Patient should be examined by physician at the time of discharge and at four, eight and twelve weeks after delivery for purpose of noting:
   a) Progress of involution.
   b) Uterine displacement.
   c) Anemia, general condition.
   d) Condition of cervix (speculum examination).

* * * * *

B. For Baby:

1. Thorough physical examination as soon after birth as possible.
2. Medical supervision. . . .
3. Nursing care. . . .

Section IV

Qualifications and Responsibilities of Hospital Personnel

I. MEDICAL PERSONNEL

A. General Considerations:

1. There should be an obstetric staff made up of the chiefs of each service which should have the entire responsibility for the professional care of the patients.
   a) In general hospitals the obstetric staff should be a division of the regular staff.
   b) The obstetric staff should be presided over by a chief of staff.
2. The responsibility for the entire obstetric service should rest with the chief of the obstetric service, although it will be necessary for him, acting as director, to delegate certain responsibilities involved in the management of subdivisions of the service.

B. Staff:

1. The chief of the obstetric service
   a) Should be a licensed registered physician, a specialist in obstetrics, and skilled in all of the operations of his specialty.
   b) He should be responsible for:
      (1) The policies and organization of the department.
      (2) The relationships within the department.
      (3) Coordination with other hospital divisions.

(4) Delegation of the responsibilities involved in the management of subdivisions of the service to the physician of the next rank.
(5) Establishment of standard technic.
(6) Calling of regular staff meetings for discussion of obstetric subjects in general and the analyses of case histories of all cases having unfavorable results.
(7) Development of an organized educational program for internes and medical students assigned to the obstetric service.

2. All attending physicians on the Maternity Service should be licensed, registered physicians who have a thorough knowledge of their specialty.

The attending physician in charge of the antepartum clinic

a) Should have had postgraduate experience in obstetrics including:
(1) An interneship in a recognized maternity hospital or a general hospital with a first class maternity service.
(2) Experience which has developed teaching ability.
(3) An understanding of the policies of the institution and the interrelationship of the various services.
(4) A knowledge of clinic procedures and ability to demonstrate them.

b) He should be responsible for:
(1) The general direction of the clinic service.
(2) Supervision of medical personnel in the clinic.
(3) Consultation on abnormal cases in the clinic and on home service (when there is one).
(4) Verification of all abnormal measurements.
(5) Instruction of internes and students in clinic procedures.
(6) Supervision of recording on all histories and records.
(7) Supervision and consultation in follow-up of postpartum clinic. (It is desirable that he have the opportunity of visiting clinic patients delivered in the hospital.)

The attending physician in charge of the hospital maternity service

a) Should have had postgraduate experience in obstetrics including:
(1) An interneship in a recognized maternity hospital.
(2) Experience which has developed a thorough theoretical and practical knowledge of normal and complicated cases.
(3) Experience in performing versions and instrumental deliveries including all types of instrumentation.
(4) Practical experience in care and feeding of newborn infants.

b) He should be responsible for:
(1) Planning of details of ward routine.
(2) Examination of new patients.
(3) Supervision of treatment.
(4) Supervision of records.
(5) The conduct of the delivery service.
(6) Instruction of internes and students in delivery room technic and conduct of labor. (Also to be available to give lectures in obstetrics to nurses.)
(7) Regular daily visits to postpartum patients in wards.
(8) Checking of observations and notations made by the resident or internes.
(9) Assignment of responsibility for care of the newborn child, providing constant supervision. (Either through pediatrician or daily visits by doctor in charge of service.)
(10) Examination of patients before discharge from hospital.

The attending physician in charge of the outdoor maternity service

a) Should have had postgraduate experience in obstetrics including:
  (1) An interneship in a recognized maternity hospital.
  (2) Experience in teaching obstetric technic and procedures.
  (3) A knowledge of the principles of public health and of the available facilities for assistance with care in the home.

b) He is responsible for:
  (1) Conduct of delivery in the home.
  (2) Assignment of cases to internes and students.
  (3) Instruction and supervision of internes and students in home delivery.
  (4) Careful observation of notations on treatment prescribed and service given.
  (5) Arrangement for regular visits to postpartum cases.
  (6) Checking up on final examination of postpartum cases before dismissal.
  (7) Supervision of the baby and where necessary, referring of baby to a private physician, clinic or baby health station.

3. The resident or senior interne on the obstetric service:
  a) Must be a regular graduate in medicine from a recognized school and have the following supplementary experience:
    (1) A junior interneship on the obstetric service.
    (2) Sufficient instruction and experience under intelligent supervision to give him:
      (a) Knowledge required for intelligent management of usual cases.
      (b) Ability to recognize abnormalities or conditions in which he needs assistance.
      (c) An appreciation of technic and procedures in delivery room and ward service.
  b) He should be directly responsible to the doctor in charge of the service to which he is assigned . . .

4. Junior internes.
  a) Must be regular graduates in medicine.
  b) Are responsible to the resident or senior interne . . .

5. Medical students.
  a) Are directly responsible to the resident.
  b) Should be:
    (1) Present at all deliveries, whether assisting or not.
    (2) Required to make a careful study of the patients on the obstetric service.
    (3) Responsible for carrying out minor duties assigned to them by the resident.
    (4) Allowed to assist at deliveries in accordance with the amount of observation, experience, and ability of the individual student.

II. NURSING PERSONNEL

A. General Considerations:

1. The nursing service should be under the direction of a superintendent or Directress of nurses.
  a) In hospitals having a school of nursing, this may include both the responsibility for the nursing service and the development of a scheme of instruction and training.
  b) There should be adequate assistants depending upon the volume of service and the size of the school of nursing.

2. Each institution must of course, make its own division of service which will, in general, be divided between the following groups:
   a) Assistants responsible for the supervision of the nursing service in the different divisions or departments of the hospital.
   b) Head nurses.
   c) Floor duty nurses.
   d) Students.
   e) Attendants.

B. Staff:
1. The Directress of the school of nursing or the superintendent of the nursing service must be a graduate, registered nurse. . . .
2. The Nursing Supervisor of the maternity department or hospital must be a graduate registered nurse, well qualified by training in this field.
3. The assistant supervisors or head nurses must be graduate registered nurses with postgraduate experience in maternity work and teaching ability in their own specialty. They should have the following responsibilities:
   a) Clinic Supervisor.
   b) Ward Supervisor.
   c) Delivery Room Supervisor.
   d) Visiting Nurse Maternity Supervisor.
4. Graduate Nurses assigned to the maternity service should be registered nurses who have had instruction and demonstrations in the policies and technics of the institution or agency with particular reference to the department in which they are working. They are responsible to the nurse in charge of the service.
5. Student nurses assigned to the maternity service should have:
   a) Theory in obstetrics and pediatrics either before or concurrently with their practical experience.
   b) Demonstrations of the accepted procedures and technics employed by the institution and supervision in carrying them out.
   (Student nurses should never carry the responsibility for home deliveries but should always be accompanied by the supervisor or an older staff nurse. The senior nurse should remain with the student until she feels that the case is progressing satisfactorily and it is within the experience of the individual nurse to complete the case with safety to the patient.)
6. Attendants employed or trained in the maternity department of an institution should have:
   a) Instruction and demonstrations in the procedures and technics to be employed in care of the patient.
   b) Regular and careful supervision.

III. SOCIAL SERVICE PERSONNEL

Sufficient personnel should be available to do the social service and follow-up not covered by the nursing personnel.

Section V

Space, Equipment, and Facilities

A. Clinic:
1. Organization.
   a) It is desirable that every maternity clinic should be directly connected with a hospital maternity service.
   b) The maternity clinic should either provide for separate sessions for prenatal and postpartum clinics or refer postpartum patients to the gynecologic clinics.

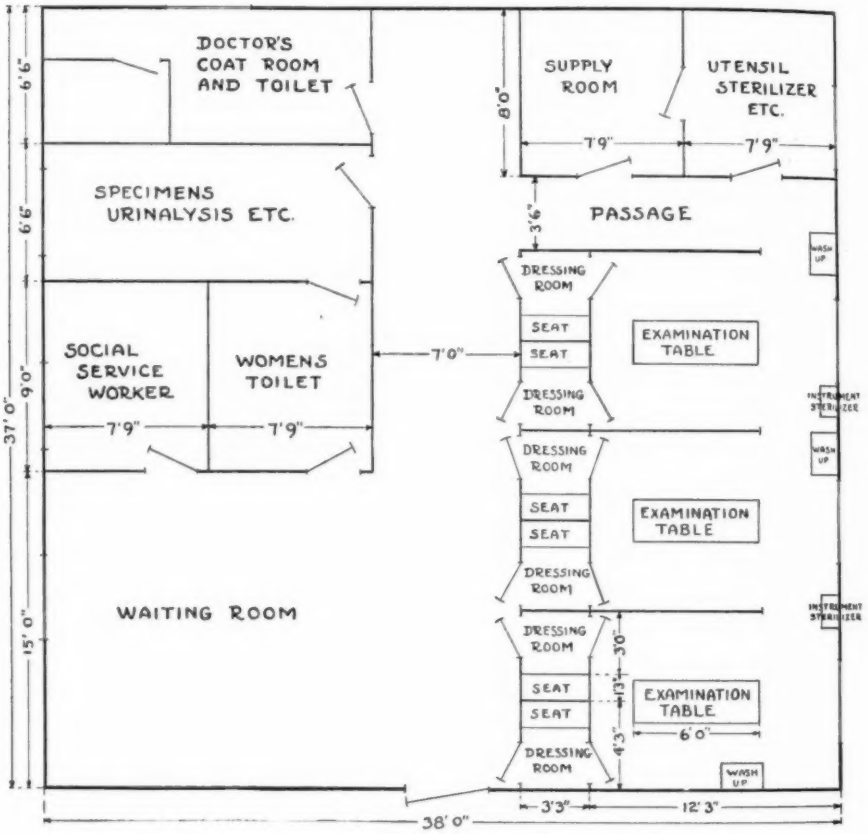
c) As far as possible, clinics should be conducted on an appointment basis.

d) The number of patients should be limited to allow for a thorough physical examination for each new patient and as much time as is needed for examination and treatment of each old patient, depending upon the needs of the individual patient. (Six patients an hour would seem to be the maximum of what one doctor can care for.)

2. Attendance of Staff.

a) The staff should be assigned definite hours in the clinic and should be required to be prompt in attendance.

FLOOR PLAN
PRENATAL CLINIC



b) A record of attendance should be kept and analyzed periodically. No physician should hold an appointment whose record of attendance is not satisfactory. (Attendance and work should be reviewed at regular staff conferences.)

c) The medical staff should be relieved as far as possible of all duties not directly concerned with the diagnosis and treatment of patients. Trained assistants for performing the executive, social service nursing, clerical, and technical functions should be provided.

3. Physical Equipment.
   a) A separate waiting room for maternity patients.
   Comfortable low chairs (not benches).
   Complete teaching exhibit. (With space for group instruction.)
   Educational posters on wall.
   Toilet room directly connected with the clinic.
   b) Individual dressing cubicles—two for each examining room with mirror, coat hanger, and chair in each.
   c) Examining room or rooms which insure privacy to the patient.

B. Hospital Maternity Service:
   1. Maternity cases should be confined to a part of the hospital which is physically separated from the rest of the hospital, or preferably a separate building.
   2. The number of patients admitted for care should be limited to the number that can be adequately cared for. (One hospital bed can provide care for approximately 24 mothers a year; on the basis of 14 days in the hospital for each patient, with consideration for days bed is unavoidably empty.)
   3. The maternity section should include as a minimum,
      a) A completely equipped delivery room. . . .
      b) An auxiliary delivery room should be provided for septic or suspicious cases including . . .
      c) Labor rooms, where patients may be kept under observation and given individual attention from the time they go into labor until they are ready to be delivered.
      d) Wards for maternity patients,
      Should be as small as possible with a capacity not greater than 12 beds. The beds should be separated by partitions where possible.
      e) Nurseries:
         (1) Well Baby Nursery.
         (2) Nursery for Premature Babies.
         (3) Nursery for Isolation.
   4. Records.
      a) Record Content:
         (1) The object of the record is to gather together all available material which will help in the diagnosis and treatment of the patient. It should include all phases of work with or for the patient.*
      b) Filing Facilities . . .

*Sample Record Forms may be found in the complete booklet.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Selected Abstracts

Toxemias of Pregnancy

Green, John S.: Observations on the Chemistry of Blood and Urine in Toxemias of Pregnancy. M. J. Australia 2: 322, 1928.

These observations were made in nineteen months on 304 patients necessitating 3,290 tests, 63 per cent of which were quantitative. The tests included urea concentration, diastatic index, blood urea, nonprotein nitrogen, uric acid, creatinine, diacetic acid, acetone, urobilin, levulose, total nitrogen in the urine, and ammonia and urea in the urine.

The patients were classified as: normal; vomiting; pyelitis; albuminuria of labor, of preeclampsia, of chronic nephritis, or of unknown origin; eclampsia; and hepatic types. While much interest has been attached to the various tests, the most useful at present are the Fouchet, the blood urea and urea concentration. It is believed that a composite picture should be made of the clinical and chemical findings, and when there is a conflict that it is wiser to act on the indication of the former.

From the etiologic point of view, every toxemic condition independently of grouping, has potentially three factors: (1) purely toxic (probably hepatic); (2) renal; (3) preexisting nephritis. For practical purposes renal impairment is more significant than hepatic. The author concludes that from the point of view of subsequent history and pregnancy, defective renal tests are very sinister and that this is a consideration in immediate treatment.

H. C. HESSELTINE.

King, G.: The Value of the Levulose Tolerance Test for Hepatic Efficiency in the Diagnosis of Pregnancy Toxemia. China M. J. 43: 205, 1929.

In normal nonpregnant individuals the levulose tolerance test gives consistently low curves. The peak of curve is usually reached within half to one hour after commencement of the test, and there is a return to the fasting level at the end of two hours.

In cases of liver disorder, unassociated with pregnancy, marked deviations from this normal reaction occur. A high curve is obtained, the peak is delayed, and there is no return to the fasting level at the end of two hours. Generally speaking these changes vary in intensity with the degree of liver damage, and they are accompanied by an increase in the bilirubin content of the serum.

In normal pregnancy the levulose tolerance curve differs in no way from the normal.

In albuminuria of pregnancy and in nephritic toxemia essentially normal results are obtained, for this type of case is characterized by the preponderance of renal damage with little or no liver damage.

In preeclamptic and eclamptic toxemias abnormal results are found. The various types of curve obtained may indicate anything from a mild liver involvement to an

almost complete suppression of function. When the severe attack has passed, the levulose curve may return to normal, indicating the restoration of liver function. Accompanying alterations in the bilirubin content of the serum may also be demonstrated.

In this group of cases, therefore, the levulose tolerance test has practical value as an aid to diagnosis and as a guiding factor in decision as to the proper treatment.

C. O. MALAND.

Vozza, F.: The Alkaline Reserve of the Blood in Normal and Abnormal Pregnancies. Ann. di ostet. **49**: 301, 1927.

The alkaline reserve of the blood as measured by the Van Slyke apparatus was found to be reduced in all stages of pregnancy. Its determination seems valuable as diagnostic aid. The reduction was found to be most marked during the first stage of pregnancy and lowest during the second stage, reaching normal about 24 hours after delivery.

There does not always seem to be a direct relationship between the degree of reduction of the alkaline reserve and the clinical picture of a severe toxemia.

In the puerperium of a case having a toxemia, the alkaline reserve becomes normal, much as it does in the normal and appears to do so independent of the toxic symptoms.

In pregnancies complicated with pulmonary infections the acidosis is not greatly increased, in the great majority of cases the alkaline reserve being that of a normal pregnancy. No change occurred in the alkaline reserve when 300 c.c. of a 10 per cent glucose solution was injected subcutaneously or when 5 to 10 units of insulin were given.

JOHN SOUKUP.

Eufinger, H.: Viscero-Sensory Liver Bile Reflexes in Pregnancy. Arch. f. Gynäk. **135**: 733, 1928.

The author found viscerosensory reflexes of the skin such as described by Head, and Makenzie in 35 per cent of the patients who were examined repeatedly during normal pregnancy. These viscerosensory reflexes were found to correspond to from seventh to tenth dorsal segments, the so-called liver zone. This zone is found in increasing frequency toward the end of pregnancy but disappears during the puerperium. It is found with equal frequency in primiparae and in multiparae. Such findings must, according to the author, be the result of a functional disturbance of the liver and the gall tract, and they increase proportionately with the increase in the bilirubin content of the blood. This reflex is always observed in patients suffering from hyperemesis gravidarum or from icterus. In the toxemias of pregnancy, the reflex is the same as in normal pregnancy. This hyperalgesia apparently does not appear more frequently in patients who present the stigmas of the vegatative nervous system.

RALPH A. REIS.

Eufinger, H. and Bader, C. W.: Liver Function in Pregnancy. I. The Storage of Dyes in Pregnancy. Arch. f. Gynäk. **134**: 720, 1928.

The authors tested the liver function in pregnancy by injecting, intravenously, 10 to 14 c.c. of a 1 per cent Congo red solution in a series of pregnant women. One hundred determinations were made in normal pregnancy, twelve in patients suffering from hyperemesis, ten in patients with nephrosis, and four in patients with icterus. The storage capacity of the liver for Congo red was found to be decreased during pregnancy and especially during the last months and in labor. This decrease

was more marked when hyperemesis or icterus was present. Their results in the toxicoses of pregnancy such as nephrosis or eclampsia were indefinite. The elimination of the dye depends upon the reticuloendothelial system but more especially upon the chemicophysical structure of the blood. An increase in colloidal instability with low cholesterol blood content always produced a decrease in the dye elimination. The almost constant finding of urobilin in the blood serum and in the urine, and the increase in bilirubin in the blood indicate abnormal liver function throughout pregnancy.

RALPH A. REIS.

Schpoljansky, G. M.: Spasmophilia in Pregnancy. Arch. f. Gynäk. **129**: 285, 1926.

The author studied seven cases of marked spasmophilia in pregnancy. In three of the cases this spasmophilia was marked by tetany, in three others by severe hyperemesis gravidarum due to a pylorospasm and in the seventh case by bronchial asthma due to a bronchospasm. Spasmophilia is due to an hypofunction of the parathyroids. This leads to a disturbed calcium metabolism and to a localized hypertonicity in the vegetative nervous system, as well as in the peripheral nervous system. Pregnancy is only an exciting cause and lowers the functional capacity of the parathyroids still further, often changing a latent functional insufficiency into an active one. As a result of this hypertonicity, local manifestations may be found producing tetany, hyperemesis, or asthma. The treatment of all forms is causal and antitetanic. The best treatment is the exhibition of calcium in large doses.

RALPH A. REIS.

Hoffmann, A.: The Vegetative Nervous System During Pregnancy, its Functional Disturbances in the Female Sexual Sphere. Monatschr. f. Geburtsh. u. Gynäk. **78**: 15, 1928.

Pharmacodynamic investigations indicate that the severe reaction produced by atropine is not a sign of increased irritability of the parasympathetic nervous system but on the contrary it is a symptom of diminished tonicity of the latter. In functional disturbances of the female sexual sphere which are dependent upon alterations in the internal secretion of the ovaries, there is a change in the neurotonicity of the vegetative nervous system. The ovarian internal secretion has an inhibitory effect on the sympathetic nervous system. Functional-clinical investigations of the vegetative nervous system during normal pregnancy yield no uniform results, usually, however, there is an increased irritability. During toxemias of pregnancy symptoms such as salivation and vomiting indicate that there is usually an augmented tonicity of the parasympathetic system. Atropine therapy yields good results in these cases. Icterus during gestation may be due to increased pressure in the biliary passages dependent upon a hypertonicity of the parasympathetic system. The successful treatment of such icterus with atropine supports this contention. In pyelitis gravidarum there is an increase in tonicity in the sympathetic system, hence we find atony and dilatation of the ureters in these cases. In alimentary glycosuria during pregnancy there is an increased tonicity of the sympathetic system. In 76.7 per cent of the author's cases he observed an adrenalin glycosuria.

J. P. GREENHILL.

Wodon: Concerning Calcium During Normal and Pathologic Pregnancy with Special Reference to Eclampsia. Bruxélles-med. **22**: 738, 1928.

Wodon feels that the total calcium content of the maternal blood has no direct bearing on the eclamptic state. Calcium, however, is found in the blood in the ionized state to the amount of about one-fifth of the total calcium. A second fifth

exists as non-ionized calcium bicarbonate while approximately three-fifths of the total calcium exists as an albuminate, which also is non-ionized. The ionic calcium varies normally from 22 to 28 mg. per liter of plasm, and is not necessarily proportional to the amount of total calcium in the body. The author has found that states of shock, narcosis and ecclampsia (convulsive state) are characterized by an uncompensated acidosis, and an ionic hypercalcemia while in such conditions as parathyroid and infantile tetany or convulsive and essential epilepsy there exists an uncompensated alkalosis and hypocalcemia.

He concludes that the amount of total calcium in eclamptic women shows no characteristic modification; that only the modifications of ionic calcium concentration in the blood can play a rôle in the eclamptic state; and finally that the convulsions of eclampsia are accompanied by an uncompensated acidosis and a state of ionic hypercalcemia.

THEODORE W. ADAMS.

Wetterdal, P.: Studies of Non-Protein Nitrogen, Uric Acid, and Amino Acids in the Blood of Pregnant and Recently Delivered Women Suffering from Albuminuria, Eclampsism and Eclampsia. Acta Obst. et Gynec. Scandinavica **7**: 275, 1928.

The author examined the nonprotein nitrogen, uric acid, and amino acids in the blood of eleven normal, pregnant and recently delivered women and also of 144 patients who had toxemia of pregnancy. Among the latter were 23 cases of eclampsia. As many as six different examinations were made on some of the patients. The author believes that these chemical tests enabled him to differentiate between the cases of pregnancy toxemia and those with nephritis in which there was an increase in the nonprotein nitrogen. The uric acid readings were found to be high in the serious cases at the height of the disease or soon afterward but the nonprotein nitrogen and amino acid determinations had no prognostic significance.

J. P. GREENHILL.

Potter, D. G. E.: Note on the Apparent Absence of Pressor Substances in Eclamptic Serum. J. Obst. & Gynec. Brit. Emp. 35: 743, 1928.

In an effort to determine the cause of the high blood pressure found in cases of eclampsia, through the action of pressor substances, the action of eclamptic blood serum as compared to normal blood serum and histamine-phosphate solution on the isolated guinea pig uterus was studied. In 5 cases of eclampsia no evidence of these pressor substances was found, the normal serum as well as the histamine solutions producing contractions of the uterus in as short, and even shorter periods, as the eclamptic serum.

FRANK SPIELMAN.

Rushmore, Stephen: Eclampsia—A Preliminary Note as to the Cause. New England J. Med. 200: 707, 1929.

The writer suggests that eclampsia is due to calcium deficiency of the mother, owing to the activity of the fetus, which finally affects the liver. Thus is given rise to the well-known disturbances of the carbohydrate metabolism in connection with this severe toxemia of pregnancy. This theory explains satisfactorily most of the characteristic features of eclampsia but fails to account for the liver as primary focus of the disease. "It may be that the liver is particularly susceptible to calcium starvation."

EHRENFEST.

Losee, Joseph R. and Macht, David I.: A Phytopharmacological Study of Eclampsia. Bull. Johns Hopkins Hosp. 46: 3, 1930.

Phytopharmacologic examination of blood sera from a series of eclamptic patients and other severe toxemias of pregnancy fails to reveal any toxic effect on the growth of seedlings of Lupinus albus. These findings speak against the presence of a toxin in the blood of eclamptic patients, but do not disprove the presence of other abnormal bodies which are not poisonous for plant protoplasm.

C. O. MALAND.

Johnston, Johnson and Nicholas: Focal Infection in Eclampsia and Further Study of Tyramine as the Etiological Factor of the Toxemia. Texas State J. Med. 25: 515, 1929.

Tyramine was found in two outspoken cases of eclampsia in concentrations of 1.25 mg. and 2.00 mg. per 100 c.c. It was not found in two cases of preeclampsia, nor was it found in a postanesthetic (chloroform) eclampsia. It was present, however (less than 1.00 mg. per 100 c.c.), in a normal seven months' pregnancy, in two men suffering from chronic nephritis (4.20 mg. and 2.00 mg. per 100 c.c.), and in a case of active tuberculosis with an intrapartum infection (1.50 mg. per 100 c.c.). The authors believe that a combination of infection and tyramine intoxication is necessary to produce eclampsia, and that bacterial action on the amino acids produces poisonous amines of which tyramine is the most important. The typical liver lesions of eclampsia were produced in two dogs, the first of which had 880.0 mg. of tyramine intravenously and 440.0 mg. subcutaneously, and the second of which had 400.0 mg. intravenously combined with 10 units of insulin. No convulsions were produced in either case.

WILLIAM F. MENGERT.

Polak, J. O.: Toxemia of Pregnancy. New Orleans Med. & Surg. J. 8: 457, 1929.

Polak classifies the toxemia of pregnancy into two groups, the pernicious vomiting of pregnancy and the preeclamptic toxemias.

In the former the pathology found in the liver and kidneys is a result of retention of toxic products consequent upon the dehydration and glycogen deficiency. In the mild cases of early vomiting of pregnancy revamping of the patients' dietetics and daily hygiene, with special reference to marital abstinence, may suffice to alleviate the condition. In more severe or persistent cases intravenous injections of 1000 c.c. of 10 per cent glucose solution should be administered daily. This failing, transfusions of 300 c.c. of whole blood plus 500 c.c. of physiologic sodium chloride solution may be tried. Absolute isolation is also necessary in these later cases. Polak has not found it necessary to empty a uterus for pernicious vomiting during nearly seven years. However if under treatment properly carried out for one week diuresis is not produced and the vomiting continues the uterus should be emptied.

In the preeclamptic toxemias and eclampsia recent studies point to a dysfunction and improper correlation of the eliminative system and endocrine control as the underlying etiology. Polak feels that the real clinical questions in toxemia are what physical type of woman breaks down under the strain of pregnancy. Thus a woman with a systolic pressure of 150 at the beginning of pregnancy is not likely to go through pregnancy successfully. From a diagnostic standpoint the toxemias may be divided into the hepatic and the renal type though it is often impossible to differentiate the two in the antepartum stage. Treatment may be classified under three main heads: the prevention, the control of the convulsion, and the management of labor in the presence of convulsions. The value of the first is continually emphasized by the great reduction in the occurrence of eclampsia in well-organized prenatal

clinics. Morphine and magnesium sulphate should be used to control the convulsions. All methods of augmenting the excretions such as absolute bed rest, forcing of fluids, low protein diets, etc., should be used in the preeclamptic stage. Finally, in the presence of convulsions the patient should be considered as a medical case and delivery aided only after complete dilatation of the cervix. The management of labor is based on three principles: (1) avoiding trauma; (2) preventing infection; (3) diminishing the shock.

THEODORE W. ADAMS.

King, E. L.: Glucose and Insulin in the Treatment of Vomiting of Pregnancy. J. A. M. A. **86**: 1414, 1926.

Seven extremely ill patients were treated with 1000 c.c. of a 5 per cent glucose solution intravenously twice to three times a day with one unit of insulin to about 2.5 gm. of sugar. Two of the seven patients died after having been subjected to this treatment for a period of fourteen and twenty-eight days respectively. The results obtained in the other patients were good. The writer believes that those that benefit by this form of treatment respond promptly and that those who are not markedly improved after a fair trial should be aborted. It is best to resort to the intravenous route when dealing with severe cases. The glucose-insulin method constitutes a definite advance.

GROVER LIESE.

Vogt, E.: Insulin Treatment of the Toxemias of Pregnancy. Klin. Wchnschr. **6**: 1339, 1927.

The treatment of the toxemias of pregnancy with insulin is only symptomatic. The use of insulin combined with the administration of dextrose solution, however, is the correct etiologic treatment for all the toxemias of pregnancy and especially for eclampsia. Vogt uses the insulin in amounts varying from 5 to 50 units daily together with a daily liter enema of 5 per cent dextrose solution. In severe cases of hyperemesis gravidarum, the dextrose solution should be given intravenously, the dosage depending upon the amount of acidosis and acetonuria present together with a consideration of body weight and of other factors involved. The combined insulin and glucose treatment of eclampsia is much more rational and more scientific than any other type of treatment now in vogue, including the Stroganoff treatment, which at best is only symptomatic.

RALPH A. REIS.

Sachs, E.: Insulin in the Treatment of Vomiting of Pregnancy. Med. Klin. **23**: 556, 1927.

The author has used insulin in cases of hyperemesis and has obtained good results but he does not consider this therapy by any means specific. Women who vomit eat readily and gain weight soon after injections of insulin. To obtain the best results the patients should have a mild hypoglycemia but not sufficient to produce symptoms. For this reason the author does not administer glucose or other carbohydrates at the time insulin is given. Small doses of insulin are used and the author found that not only was the patient's appetite improved but her entire physical appearance.

J. P. GREENHILL.

Pery: On the Employment of Insulin in Hyperemesis Gravidarum. Bull. Soc. d'obst. et de gynéc. **17**: 45, 1928.

During the past two years the author has employed insulin for pernicious vomiting of pregnancy and since all the patients recovered without obstetric interference, he concludes that insulin is a very valuable drug for these cases.

J. P. GREENHILL.

Levy-Solal, Dalsace, and Cohen-Solal: Vomiting of Pregnancy. Desensitization Therapeusis. Gynéc. et Obst. **18**: 27, 1928.

The attempt to cause specific desensitization by placental extracts was unsatisfactory, therefore a stable nonspecific albumin (the peptone of Witte) was employed. Eight patients were treated for vomiting of pregnancy by this method. No other therapeusis was used and the possibility of mental suggestion was negatived. The results appear to have been uniformly successful. From this it is concluded that vomiting of pregnancy has its origin in the phenomenon of shock, and is amenable to nonspecific protein therapy.

GOODRICH C. SCHAUFFLER.

Van De Putte: Duodenal Alimentation in the Uncontrollable Vomiting of Pregnancy. Progrès med. **11**: 1371, 1926.

The author has used the duodenal tube in 6 cases of pernicious vomiting with excellent results, the vomiting clearing up in a very short time. Duodenal feedings and medication were administered by this method. One patient who was relieved of vomiting subsequently died.

GOODRICH C. SCHAUFFLER.

Leven, G.: Radical Cure of Pernicious Vomiting of Pregnancy in All Stages of Pregnancy. Revue franç. de gynéc. et d'obst. **23**: 645, 1929.

The ordinary nausea and vomiting of early pregnancy and pernicious vomiting are successive stages of the same affliction, dyspepsia, created or aggravated by pregnancy and that this is often complicated by gastric dilatation alone or combined with aerophagy. The dyspepsia is treated by rest in bed, water diet for twenty-four hours, milk diet the next twenty-four hours, followed by the gradual resumption of food. Sodium bromide is given twice daily. Aerophagy is treated by means of the same diet and medication, and also by the addition of bismuth carbonate and soups. Deep breathing exercises are also recommended. For gastric dilatation the same diet and sodium bromide are prescribed but the patient is placed in bed with her hips elevated on pillows. After getting up the patient wears a corset. Constipation and oliguria during the first few days are not combated by the author because he considers these to be physiologic.

J. P. GREENHILL.

Falls, F. H.: Toxemias in Pregnancy. Illinois M. J. **46**: 292, 1929.

Eclamptogenic toxemia in the author's opinion is due to a split protein toxin derived from 3 main sources, the endogenous protein metabolism, the exogenous protein metabolism, and from the fetus and its placenta. The level of toxins in the blood is maintained by the ratio of toxins excreted by the system to those derived from the above sources. On the basis of this viewpoint the author's management of cases consists of bed rest and milk diet for every patient whose blood pressure goes up to 140 and who develops albuminuria with casts in the urine. If no improvement occurs pregnancy is terminated.

For hyperemesis gravidarum in which there is a starvation acidosis superimposed upon a state of unstable and abnormal irritability of the sympathetic nervous system and probably a vitamin deficiency, rest, fluids by rectum and hypodermoclysis, sedatives, and glucose intravenously are recommended.

FRANK SPIELMAN.

Mitchell, Ross: The Late Toxemias of Pregnancy. Canad. M. A. J. **21**: 384, 1929.

The author notes the lack of unaminity in the classification of late toxemias as illustrated by: Cruikshank, Hewitt, and Cooper grouping them into albuminuria,

preeclampsia, nephritic toxemia, and eclampsia; H. J. Stander into eclampsia, preeclampsia, chronic nephritis complicating pregnancy, and eclampsia superimposed upon nephritis; and G. F. Gibbert into chronic nephritis preceding the pregnancy, albuminuria occurring during any one pregnancy, albuminuria occurring during each succeeding pregnancy, and nephritis remaining after each pregnancy. The writer attempts to fuse the above groups for practical purposes into eclampsia, nephritis in pregnancy, and low reserve kidney.

He urges antenatal care for months instead of weeks, as well as postpartum care, in order that the patient may be properly treated and advised. Any pregnant individual with a systolic pressure of 140 or more and albuminuria is considered critically ill.

The summary emphasizes the need for careful and accurate history, examination and record, explanation of prognosis and advice, and eradication of focal infections.

H. C. HESSELTINE.

Schwarz, G.: Blood Pressure and Eclampsia. Arch. f. Gynäk. **135**: 133, 1928.

In 95 per cent of 1065 patients there was no increase in blood pressure at the end of pregnancy. During labor there occurs a slight rise during the pains but there is always a drop to normal during the intervals between pains. During the puerperium the blood pressure also remains normal except following postpartum hemorrhage when there is a drop of 10 to 15 mm. The afterpains also produce, as do the labor pains, a slight rise in pressure.

A hypertension, unless due to some intercurrent disease, must always be considered as ominous. Even when no other symptoms are present it must be regarded as a definite preeclampsia. Zangemeister has previously shown that the preeclamptic can be distinguished from other types of hypertension by the fact that in the former there is the definite oscillation of the readings whereas in the latter the readings are constant. The degree of hypertension is never an indication of the degree of danger present, for sometimes a slight but persistent hypertension with occasional periods of marked hypertension is more significant than a persistent and marked hypertension.

With preeclampsia present, extreme care must be taken to avoid any measures which will increase the blood pressure or the intracranial pressure. In most cases of preeclampsia, the blood pressure drops 10 to 15 mm. when the uterus is emptied and returns to normal in 24 hours. In true eclampsia, however, the blood pressure may not return to normal for several weeks. This factor depends upon the number and severity of the convulsions and upon the amount of puerperal bleeding. There is apparently no relationship between the degree of hypertension and the amount of albumin present in the urine, but there is a close relationship between the degree of hypertension, the degree of diminution of urinary excretion and the persistence of the edema.

RALPH A. REIS.

Strassmann, E.: Physiologic Hypertension of Pregnancy. Arch. f. Gynäk. **136**: 345, 1929.

Strassmann reviews the literature and reports his findings in 230 pregnant women. Blood-pressure readings were taken from the seventh month of pregnancy through the second month postpartum. No changes in blood pressure were observed in one-half of this group, but in the other half there was a characteristic rise of at least 10 mm. in systolic pressure; in 50 per cent of this second group the rise was over 20 mm. In 30 per cent of this group the blood pressure was 130 or more at term. The author feels that a blood pressure of 150 mm. or less with normal urine findings must be considered physiologic.

The postpartum blood pressure is below normal, being under 110 mm. in 80 per cent, and in 70 per cent the systolic pressure drops more than 20 mm. This typical drop in blood pressure cannot be ascribed to the blood loss of delivery because those patients losing over 500 c.c. of blood during delivery showed no greater drop in pressure than did those who lost less than 500 c.c. The blood pressure readings return to normal in from four to eight weeks postpartum.

The author is of the opinion that this frequently found hypertension must be considered as physiologic and that it is an accommodation phenomenon due to the increased physical and chemical requirements on the part of the pregnant woman.

RALPH A. REIS.

Bárczi: Treatment of the Edemas of Pregnancy, and the Prevention of Eclampsia with Thyroid Extract. Zentralbl. f. Gynäk. 53: 209, 1929.

Congenital lack of adjustment of the glands of internal secretion, and especially of the thyroid is stressed as a causative factor in the production of the toxemias of pregnancy. Thyroid enlargement during pregnancy is assumed to be a protective reaction.

Treatment of the edemas of pregnancy was along the following lines: mild cases, 0.5 gm. thyroid extract daily for three weeks; moderately severe cases, 1.0 gm. daily for one week and then 0.5 gm. for two more weeks; severe cases, treatment continued for five weeks. In 20 cases treated no symptoms of thyroid intoxication were observed. Bed rest and salt-free diet were not used. All labors except one (forceps) terminated spontaneously, and eclampsia did not occur in any.

WILLIAM F. MENGERT.

Klein, W. O.: Ten Years of Eclampsia and Its Treatment. Arch. f. Gynäk. 139: 413, 1930.

During the past ten years there were 162 cases of eclampsia among 7263 deliveries at the Mainz clinic, an incidence of 2.2 per cent. The maternal mortality was 3.7 per cent and the fetal mortality 32 per cent. Of the 162 patients, 82 had convulsions and in this group the maternal mortality was 7.4 per cent and the fetal mortality 30 per cent; 95 patients were delivered spontaneously, 27 were delivered by forceps and 16 by cesarean section. Among the spontaneous deliveries there was no maternal mortality and a fetal mortality of 26.4 per cent. The maternal mortality among the cesarean sections was 6.2 per cent and the fetal mortality 26 per cent. All patients were subjected to rigorous dietary measures, venesection and in addition many were given the Stroganoff treatment. One interesting point revealed by this study is the fact that 22 of the 162 women were suffering from preexisting nephritis.

Klein believes that every case must definitely be individualized. Up until two years ago he followed the middle path of therapy between the radical and conservative types of treatment. Since 1928, under the influence of Stoeckel, the clinic has adopted the active type of treatment for almost all cases and he concludes that every patient with convulsions must be delivered immediately. The method of delivery chosen depends upon the conditions present, either by forceps or cesarean section irrespective of the fact that the fetus may be alive or dead. Patients with threatened convulsions should be treated by venesection, rest, diuresis and diet. All patients must, of course, be under constant and careful observation and a most rigid dietary control.

RALPH A. REIS.

Clason, S.: The Results of Eclampsia and Eclampsismus in the Karolinian Institute in Stockholm for 1920-1927. Acta Obst. et Gynec. Scandinavica **8**: 43, 1928.

This study supplements a similar one made in 1921. During the years 1913-19, the treatment of eclampsia was expectant and among 102 cases the maternal mortality was 10.8 per cent. During the years 1920-27 the treatment of this condition was the Stronganoff-Zweifel one, and among 125 cases, the mortality was 5.6 per cent. The total maternal mortality for the entire series from 1913 to 1927 was 7.7 per cent, the total fetal mortality 24.4 per cent.

In the auth ·'s clinic, pregnancy is interrupted when the symptoms become worse in spite of me cal treatment.

J. P. GREENHILL.

Waldstein, E[illegible]nd: Therapy of Eclampsia. Zentralbl. f. Gynäk. **51**: 1757, 1927.

At the F a Hospiz in Vienna, 117 cases of eclampsia, of which 11 were antepartum, 61 s urtum, 45 postpartum, were treated resulting in only two deaths. One patien d after the 89th convulsion, being delivered by cesarean section after the sevent[illegible] ulsion; the other succumbed to an aspiration pneumonia.

Early deliv[illegible], which was accomplished on an average of two and one-half hours after the first [illegible]nvulsion, is held responsible for the extraordinarily low mortality of this series. E[illegible] tensive use of cesarean section was made when convulsions occurred antepartum or at the very onset of labor. Forceps, version and extraction were freely employed to terminate advanced labor. No death has occurred in the last 69 cases. To a certain degree the number of convulsions before delivery determines the number occurring after delivery, therefore, delivery should be accomplished as soon as possible after the first convulsion. The delivery was often followed by a venesection and infusion of saline solution. The use of morphine to control the convulsions has been entirely substituted by 0.3 gr. of luminal, never more than 3 times in twenty-four hours.

GROVER LIESE.

Fueth, R.: A Case of Eclampsia in Early Pregnancy. Arch. f. Gynäk. **133**: 40, 1928.

This is a report of a case of fatal eclampsia occurring during the fourth month of pregnancy. The patient, a twenty-two-year-old primipara, suddenly fainted and was admitted to the clinic with the provisional diagnosis of acute appendicitis. She was drowsy, apathetic, and complained of abdominal pain. A slight vaginal bleeding aroused the suspicion of a criminal abortion. Soon after admission she had a severe vaginal hemorrhage which necessitated a manual emptying of the uterus. The patient then had several epileptiform seizures with loss of sphincter control, became more and more stuporous and died in five hours just after a bilateral renal decapsulation. Autopsy showed no gross lesions of brain tissue and only slight changes in the liver and kidneys. Fueth discusses the 55 cases of eclampsia early in pregnancy which he found in the literature.

RALPH A. REIS.

Laffont, A., and Larribère, J.: The Treatment of Eclampsia by Somnifène. Cure and Continuation of Pregnancy. Rev. franç. de gynéc. et d'obst. **24**: 148, 1929.

In the literature are reports of 81 cases where pregnancy continued after the cure of eclampsia. However, among these cases only 23 children were born alive. Hence in most of the cases the convulsions caused the death of the fetus which was subsequently expelled. It is logical to assume that the fetal death in these cases contributed to the cure of the eclampsia just as a cure results after delivery of a baby.

Among the 23 instances where live children were born, labor occurred after forty-eight hours in 2 cases, after three days in 1 case and after four days in 4 cases. Hence there were only 14 cases where gestation continued more than four days after the last convulsion.

The authors treated eight eclamptic patients with somnifène. Two patients were treated postpartum, three during labor and in one case labor began a few hours after the injection of somnifène. Of the two patients treated during pregnancy, one did not go into labor until nineteen days after treatment and the other thirty-four days later. Both children were born alive. Hence, the authors conclude, these two cases were actually cured of eclampsia during pregnancy. J. P. GREENHILL.

Laffont and Jahier: One Hundred and Forty-Three Cases of Eclampsia Observed at the Algerian Maternity. Bull. Soc. d'obst. et de gynéc. 17: 579, 1928.

Since 1918 the number of cases has increased considerably. Until recently eclampsia was very uncommon among the natives of North Africa but in 1927, 6 of the 13 eclamptic patients were natives. The author believes that the great frequency of syphilis is responsible for these cases of eclampsia. He found a large incidence of syphilis among all the patients with toxemia. In spite of the increase in the number of patients with eclampsia, there has been a decrease in both maternal and fetal mortality. In the treatment the author relies upon profuse gastric and intestinal lavages, drastic purgation and venesection. If the woman is in labor she is rapidly delivered by incisions in the cervix and vaginal cesarean section, if necessary. If the patient is not in labor and medical treatment does not produce a rapid improvement, abdominal cesarean section is performed after the seventh month and vaginal hysterotomy before this period. J. P. GREENHILL.

Peckham, C. H.: Chronic Nephritis Following Eclampsia. Bull. Johns Hopkins Hosp. 45: 176, 1929.

A surprisingly large percentage of eclamptic women are found to have definite though relatively mild chronic nephritis a year or more after the attack. Much more nephritis follows severe than mild eclampsia, and it is more likely to develop after the antepartum type. The latter is particularly true when the eclampsia develops at some time before the pregnancy has reached term.

Out of 5 cases of repeated eclampsia, nephritis developed in 3 after the second attack. None of these patients gave a history indicative of chronic kidney disease prior to the convulsive attack. There appears to be no connection between the number of convulsions and subsequent nephritis. However, it develops relatively less frequently when the duration of the convulsive attack is under six hours. There seems to be a direct relation between the amount of hypertension with albuminuria and later permanently impaired kidneys. With a pressure of 200 or more and albuminuria of at least 10 grams, three-quarters of the patients ultimately develop nephritis.

The blood chemistry at the time of eclampsia gives no indication of what may develop later.

A slow return of blood pressure to normal is suggestive. However, nephritis may develop within the year, even in patients who were discharged with normal pressure and negative urine. On the other hand, hypertension and albuminuria persisting throughout the puerperium do not necessarily indicate that the kidneys will sustain permanent damage. The outlook for a subsequent pregnancy following eclampsia is less favorable than is generally believed.

Even the most adequate prenatal care will not always prevent eclampsia. Consequently, all toxemias should be carefully watched since even the mildest types may occasionally eventuate in an altogether unexpected eclamptic attack.

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